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THE FLEET AND ITS PERSONNEL.

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Motto: Commune bonum.

The navy requires the most perfect organization and administration. Sea power has been, and will continue to be, one of the greatest political factors in modern history, and, since the battle fleet is the embodiment of a nation's sea power, it follows that a nation's place among the world-powers depends largely upon the strength of her fleet. From considerations of cost, the numerical strength of a fleet must, necessarily, be limited; and no one power, however wealthy, can aspire to the control of the sea simply through numerical superiority in battleships; therefore, each ship should be as nearly perfect as it is possible to make her. The ship will be as efficient as the organization and administration of the navy and the ability of the ship's crew will permit, and, to a large extent, the latter factor depends upon the former.

The perfect naval organization may be likened to a perfect machine in which each part is designed, neither too strong nor

too weak, for its particular function; in which no part is unnecessary to the whole; and in which, even under the heaviest working load, all parts perform their work smoothly, automatically, and continuously.

Only through practically perfect organization and administration can the battle fleet be brought to the highest possible state of efficiency and maintained in readiness to strike quickly and surely the moment war is declared. Such is the true meaning of military preparedness, which is regarded by all competent military men, and by all true statesmen, as a national necessity, and which has been advocated by the ablest of our public men from the time of Washington to the present day. It is now well understood that while years are required to build, equip and man a battleship, a war may be finished in a few weeks, or, at the most, a few months. Our national history is the strongest proof of the utter folly of unpreparedness for war. We have never fought a war that could not have been much shortened, and the loss of men and money correspondingly lessened, if we had only been prepared. At the outbreak of the Spanish-American war our navy was somewhat better prepared than is usual with us, but it must be remembered that Spain was a third-class power. Even then, much time was lost in getting ready after war became imminent, and much money was spent in the purchase of a heterogeneous collection of cruisers, yachts, colliers, etc., which, for the most part, but illy served their purpose, and which are of little permanent value to our naval establishment. Had the $50,000,000 hurriedly voted by Congress for national defense at the outbreak of war, been appropriated a few years earlier, eight powerful battleships could have been added to the navy, and with such a squadron ready to sail to the coast of Spain, not one of the enemy's ships would have dared cross the Atlantic. In fact, there is every reason to believe that had we possessed such a squadron, the war itself would have been impossible. Our unpreparedness was the natural result of our lack of naval policy.

We want our fleet to be such a power as the world has never seen. While its true purpose is the preservation of peace and the furtherance of civilization, it must always be ready for the supreme arbitrament of war. An invincible navy would be the most perfect guarantee of peace, since it would make war prac-

tically impossible, or it would so easily overwhelm the enemy as to bring a war quickly to a close. In any case, if the nation is to be allowed to work out its high destiny peacefully and honorably, a navy that will guarantee peace is a national insurance well worth the price we must pay for it.

In recent years our Congresses, in deference to the awakened interest of the people, have provided liberally for the naval establishment, and succeeding Congresses may reasonably be expected to foster its growth. It is the duty of the officers of the service to do all in their power to bring into operation the most perfect organization and administration possible, to the end that there may be no misdirected effort and that the maximum fighting efficiency may be attained.

Much has been written on the subject of administration and organization of the navy, particularly in regard to the enlisted personnel, but as yet we are far from having any system that will meet the requirements of the service. If the subject could be handled by a General Staff or by some form of Board of Control, it would, no doubt, be readily solved; but in the absence of such control naval affairs are managed with such lack of continuous policy, such haphazard expedients of the moment, that good and lasting results are impossible of achievement. Indeed, it speaks well for the service in general, that, under such circumstances, it has arrived at a fair state of efficiency. The fault is fundamental, rather than particular, since even the state seems to have no continuous policy.

The navy, as a fighting organization, is not as efficient as it should be, and this fault is due to the absence of proper organization more than to any other cause. This fault, which is apparent in all parts of our present system, may be laid at the door of the law-maker, the administrator, and the naval officers themselves. In fact, the great obstacle to reform is the impracticability of fixing the responsibility for present defective methods; but the service is primarily responsible. Taking, for example, the question of a General Staff for the navy; progressive officers have been advocating for years the creation of a General Staff, but without success, yet its necessity is almost universally recognized. Congress is looked to for the necessary legislation to create the desired administrative body, but Congress cannot be expected to act until the necessity for action is made evident, and

until a plan endorsed by the leading naval officials is submitted to it for action. No plan has yet been agreed upon by our naval officials for the very sufficient, but regrettable, reason that any plan that will adequately serve the desired purpose will decrease the prestige of particular bureaus or officials. It appears, therefore, that the efficiency of the service must suffer until, by an Executive order or Congressional action, the much-needed reform may be obtained in spite of its opponents. Necessarily opinions as to what form of General Staff is most desirable vary widely, but the service would be content with any reorganization that would promote systematic and efficient administration. Until we get a General Staff, or its equivalent, no comprehensive system is possible, for the simple reason that, without it, there can be no co-ordination between conflicting interests in the service and no permanent and continuous policy carried out.

ORGANIZATION OF THE PRESENT FLEET.

The history of the American Navy records not a single fleet action in the true sense of the world. This is the result, not of tactical or strategical considerations, but rather of our own weakness or that of the enemy, which prevented the mobilization of fleets. History of older and more experienced nations teaches us that, in naval warfare between strong forces, vessels must be able to act together in squadrons and fleets, and it is probable that in any great naval war of the future the decisive battle will be between fleets representing the real naval strength of the respective powers. So, in time of peace, we train our officers for the ultimate test by cruising and maneuvering in squadrons, and in war games. Aside from this main object, the division of ships into squadrons undoubtedly has the most beneficial effect on the officers and enlisted men, in that it cultivates alertness and keen judgment, promotes rivalry and emulation, aids in keeping the ships "taut," and in many ways promotes the *esprit de corps*. This leads up to the question: why not extend this principle to the entire service; why not put all our gunboats and cruisers in squadron; not, as is now too frequently the case, without regard to types, but of similar ships, as nearly as possible?

Let us see what disposition could be made of our present material. Taking into account the vessels now under construc-

tion, squadrons of four vessels each could be organized, these squadrons combined into fleets, as follows:

HOME STATION.

NORTH ATLANTIC COAST.

FIRST FLEET.	SECOND FLEET.
First Battleship Squadron.	*First Battleship Squadron.*
Connecticut.	Georgia.
Louisiana.	Nebraska.
Minnesota.	New Jersey.
Kansas.	Rhode Island.
Second Battleship Squadron.	*Second Battleship Squadron.*
Vermont.	Iowa.
Virginia.	Massachusetts.
Idaho.	Indiana.
Mississippi.	Oregon.
Battle Cruiser Squadron.	*Battle Cruiser Squadron.*
Tennessee.	California.
Washington.	West Virginia.
Colorado.	Maryland.
Pennsylvania.	South Dakota.

CRUISER (Training) SQUADRONS.*

(1)	(5)
New York.	Albany.
Columbia.	New Orleans.
Minneapolis.	Cincinnati.
Olympia.	Raleigh.
(2)	(6)
Chicago.	Marblehead.
Baltimore.	Montgomery.
Newark.	Detroit.
San Francisco.	Topeka.
(3)	(7)
Galveston.	Bennington.
Tacoma.	Yorktown.
Boston.	Concord.
Atlanta.	
(4)	
Alert.	
Ranger.	
Castine.	
Machias.	

*Independent squadrons, except when mobilized with fleets.

PACIFIC STATION.*

ENTIRE PACIFIC OCEAN.

First Battleship Squadron.	*Second Battleship Squadron.*
Wisconsin.	Missouri.
Alabama.	Maine.
Illinois.	Kearsarge.
Ohio.	Kentucky.

First Cruiser Squadron.	*Second Cruiser Squadron.*
Charleston.	Denver.
Milwaukee.	Des Moines.
St. Louis.	Chattanooga.
Brooklyn.	Cleveland.

Third Cruiser Squadron.	*Fourth Cruiser Squadron.*
Wilmington.	Annapolis.
Helena.	Vicksburg.
Marietta.	Princeton.
Wheeling.	Newport.

PHILIPPINE SQUADRON.

This squadron should include all the mosquito fleet of gunboats now stationed in those waters. These little vessels, having no military value except police duty in the waters of the archipelago, should constitute a permanent flotilla, manned largely by native crews. There appears to be no reason for including the Philippine Squadron in the Pacific (or Asiatic) Fleet; indeed, from geographical, political and administrative considerations, it should constitute an independent command. There is nothing in common between it and the battle fleets.

In connection with the foregoing plan, each battleship or battle-cruiser squadron should be commanded by a vice- or rear-admiral; each second-class cruiser squadron by its senior captain, and squadrons of small cruisers and gunboats by commanders. Thus, many officers would get the opportunity to command squadrons years before they do under present conditions. This is very important; the navy cannot have too many officers trained for supreme command.

* Battleship squadrons to alternate for duty in Asiatic waters. All squadrons to rendezvous annually for fleet maneuvers.

Fleets, composed of squadrons of battleships, battle-cruisers, destroyers, scouts, and auxiliaries, should have a vice-admiral in command, who, under the General Staff, would shape the work of the fleet, but would look to the squadron commanders for *results*. He should be relieved of all comparatively unimportant routine work, especially in the matter of correspondence. For some reasons his flagship should be a very fast battleship or the highest type of battle-cruiser, and not included in any squadron. The commander-in-chief in that case would be able to take his place in the line of battle or to remain free to direct the engagement from any position desired. If this idea should be adopted, it should constitute the sole exception in the general plan of squadron formation.

ADVANTAGES OF PROPOSED ORGANIZATION.

Under the proposed organization of the battle fleet we have unusual means of promoting rivalry and emulation, not only among the ships of a homogeneous squadron, but also between the squadrons themselves. *Esqrit de corps* and pride in ship and service would be more easily cultivated. Comparisons and the creation of standards of efficiency would become the order of the day, because the ships of a type, being always in company, and cruising or maneuvering under exactly the same conditions, could be compared more easily. For example, take the comparison of target practice scores; if ships of a type are scattered they are bound to fire under different conditions, however slight, and comparison becomes difficult; and, too, if one ship is in Chinese waters and her sister ship is on the home station, it is impossible to cultivate the intense rivalry that should exist if the results of the practice become known only several weeks after the interest in the practice has somewhat subsided. It can easily be imagined that, in a squadron of four battleships of the same type, the interest and enthusiasm among the officers and men at target practice would approach that shown in the intercollegiate football contests. This would do much for straight shooting as well as for the morale of the men.

At present one of our squadrons is composed of an armored cruiser, two third-class cruisers of very different types, two gunboats of a type, a monitor, and a wooden corvette training-ship. In the squadron of seven ships, therefore, are six different types,

all having different maneuvering qualities, different speeds and steaming radii, and different types of guns and mounts. Other squadrons are not much better off. Of course, it is useless to expect the best results in training officers in evolutions with such nondescript squadrons; and there cannot be a keen spirit of rivalry among gun-pointers using vastly different types of guns and mounts, because the man with open sights and a gun carriage that it takes four men to train knows he cannot compete with another who uses a telescope sight and delicate elevating and training gear.

From considerations of economy, also, a squadron should be homogeneous, as the ships could then cruise at their most economical speed, which would be the same for all. Also coal expenditures would, as a matter of routine, be compared daily by signal, with the result that the fire-room forces would soon learn how to get the best results from the coal. Incidentally, if ships of the same type should happen to have boilers of different types, the simple fact of their cruising together under exactly similar conditions would furnish a ready means of determining the better type of boiler.

THE HOME BASE.

With a large fleet divided into squadrons, it would seem important that each squadron should be attached permanently to a base, and that the squadron should always operate from its base except, perhaps, in time of war. In the matter of repairs, especially, it would be conducive to efficiency and economy to have repairs to a vessel always made at one place where her plans, patterns and spare parts are kept, and where the officials and workmen are most familiar with that vessel. To be thoroughly effective and economical, any work must be thoroughly organized. The necessity for efficiency needs no discussion, and, in view of the increase of our fleet, economy is becoming more and more imperative. The more economical we are the more money we will have for new construction, because Congress and the public are more interested in the total annual appropriation than in the number of new vessels provided for.

It is believed that the best results could be obtained by the establishment of home bases for squadrons, to be a home in every sense of the word, the home of the ship, the officers, and the

men. It should be located near a great commercial and labor center, and should have every facility for docking, repairing, equipping, provisioning, and manning the fleet expeditiously.

To each home base should be attached a battle fleet, which, as described further on, would consist of two squadrons of battleships, one squadron of battle-cruisers, a squadron of scouts, two flotillas of destroyers, and the fleet auxiliaries. There would also be attached to these stations one or more cruiser or training squadrons and some vessels of the coast defense fleet. This is a large number of vessels to be attached to one station, but it would have its advantages, as may readily be shown. Primarily, it is a good thing for a commander-in-chief to be always in immediate touch with the vessels of his command; the more fully that principle is carried out the better able is he to keep his forces in hand, especially in matters relating to repairs.

At the home base should be a berth for each vessel of the fleet, and alongside should be a ship house in which could be stored stores and provisions, spare parts of machinery, etc., for that particular vessel. All should be so conveniently arranged that, in case of need, a vessel could arrive at the station and get ready for sea in the time actually required for her crew to put her stores on board. Here, also, should be stored the guns and mounts and all equipment necessary to convert naval auxiliaries of the merchant marine into armored cruisers.

The home base should have barracks for all enlisted men not in seagoing ships, recreation grounds, a club-house for the men, with gymnasium, baths, canteen, etc. There is every reason why the station should be beautified with handsome buildings, well-paved streets, shade trees, lawns, a park, etc. There should be quarters for all officers, and an officers' club. Since the station, under this system, becomes the permanent home of officers and men, it should be made as attractive as possible.

At present all navy-yard employees are civilians; this is all wrong. A large proportion of the positions could, and should, be filled by men who had served a certain length of time on board ship—say three enlistments, or twelve years. In this manner there could be built up a well-disciplined, highly-organized navy-yard force of trained men constituting a really effective Naval Reserve such as we can never hope to have by any other means. There can be hardly any doubt that by holding out this

employment at the home base as a reward for service in the navy, continuous service would become the rule, rather than the exception as under the present system. With this inducement to remain in the service and the pension and other advantages there would be not the slightest difficulty in attracting a very desirable class of men to the navy and retaining them permanently, for the simple reason that the men would be far better off in the service than out of it.

Under these conditions the enlisted man would have the opportunity to marry and make for himself a home, which is something that appeals to the average man the world over, and which under present conditions is quite impossible. While it would probably be to the advantage of the service to have only unmarried officers and men, it is an impracticable condition, and any system of organization must take cognizance of the fact.

The duties of the fleet in time of peace are to keep in readiness for war and to show the flag where it is most needed for the protection of national interests. The first duty applies to every vessel in the service. The second duty could most properly be performed by the cruiser or training squadron.

Since the battle fleet is the real strength of the navy, it should be kept in close touch with the home bases and should be kept so tuned up to the highest pitch of efficiency as to be ready for battle at a day's notice. Every ship should be kept in commission. Rather than let ships rust away, it is better to keep them going and replace parts or effect repairs as necessary, as undue deterioration cannot be prevented otherwise. But it is bad business to keep a ship going for years without repairs, and then, when she can no longer be run with safety, when she can no longer steam, or when her battery is worn out, lay her up for two or three years' overhauling. It is bad business because during the latter part of her cruising she is not an efficient ship, and while she is out of commission she is unavailable for war. It would be far better to repair vessels frequently (say once each year) and for very short periods at a time. By anticipating repairs and making preparations in advance of a vessel's arrival at the navy-yard much time could be saved. In other words, system is needed. Under the proposed system it would probably never be necessary to put a ship out of commission or to keep her under repairs for a longer period than a month during her

whole lifetime—that is until she became obsolete and in need of rebuilding, by which time, under a national building programme, she would be replaced by a new ship.

Since there are attached to the home base eight battleships, four battle-cruisers, a dozen destroyers, one or two squadrons of cruisers, the fleet auxiliaries, and several coast-defense vessels, repair work could be distributed in such a manner as to give employment to a practically constant number of yard workmen. It is, of course, important that a navy-yard should have steady work. To this end the year's work of each battle fleet might be arranged on some such lines as the following:

First Battleship Squadron.

1st quarter: Cruising in squadron abroad; target practice on return.
2nd quarter: At home base for repairs, small-arm practice, port exercises.
3rd quarter: Cruising in squadron, near home base; record practice.
4th quarter: Join fleet for annual maneuvers.

Second Battleship Squadron.

1st quarter: Cruising in squadron near home base.
2nd quarter: Cruise abroad; target practice.
3rd quarter: At home base.
4th quarter: Join fleet for annual maneuvers; target practice.

Battle Cruiser Squadron.

1st quarter: At home base.
2nd quarter: Cruise abroad; target practice.
3rd quarter: Cruise near home base.
4th quarter: Join fleet for annual maneuvers; target practice.

Scout Squadron.

1st quarter: Cruising abroad with first battleship squadron.
2nd quarter: } At home base.
3rd quarter: }
4th quarter: Join fleet for annual maneuvers.

Destroyer Flotilla.

1st quarter: }
2nd quarter: } At home base or exercising in vicinity.
3rd quarter. }
4th quarter: Join fleet for annual maneuvers.

Cruiser Squadron.

1st quarter: }
2nd quarter: } One month at home base for repairs and port drills; the remainder of the time cruising abroad or where most needed.
3rd quarter: }
4th quarter: } Join fleet for annual maneuvers, if circumstances permit.

The foregoing schedule provides for a very full year's work for all the fleet, and, at the same time, the navy-yard work is distributed quite evenly over nine months of the year; for the remaining three months the yard work could probably be expended to advantage on the coast-defense and other vessels not attached to the battle fleets.

It is quite probable that, in future, a portion of the ship-building will be done at navy-yards, so there would always be plenty of work for the yard force even if work on the fleet came to a standstill.

By having the ship under repairs for comparatively short periods each year, the work would be under the direct supervision of her officers. This is a very important consideration, since the seagoing officers best understand the needs of their ship and are at all times responsible for her condition.

On the score of economy this system would be preferable, since, while parts of the ship are under repairs, all other parts would be kept in good condition by the crew. By keeping a ship in commission continuously, deterioration is reduced to a minimum. This is true not only of ships but of any piece of machinery. It is especially applicable to torpedo vessels.

Unnecessary repairs would generally be avoided, as the commanding officer would best understand the necessity of getting his ship into good cruising condition. At the same time he would see that all necessary work was done, as he would realize that his ship would have to be in readiness for any duty during the following year.

BUILDING PROGRAMME.

In building programmes, the sense of proportion is sometimes conspicuous, and again is almost entirely lacking; in the first case the tactical and strategical importance of the various types of vessel necessary for an efficient fleet are given due weight; in the second case the desirability of certain types either is not recognized or one type is given undue preference over others. It is sometimes a question of cost that does not permit of a fully equipped fleet; sometimes it is a question of policy; or it may result from widely varying opinions of naval experts as to what is required.

It is not surprising that, thus far, in our naval development, we have had no continuous building programme, either as to the composition or the size of the fleet. The reason, of course, is the absence, in our administration, of any responsible Board of Control with powers to devise and carry out a naval policy. This defect in our administration may some time be corrected by the establishment of a General Staff.

In this era of naval expansion by all the leading powers, it is not practicable in outlining a programme to set a limit to the size of our entire fleet beyond the requirements of the immediate future. We can only add to our fleet, from time to time, to keep at or near the front in naval power. In view of the well-known ambitious programmes of other nations, however, it would seem necessary that we should increase our force as soon as possible to forty battleships, with a proper proportion of other types. Such a policy would give us five unit battle fleets, each of the composition shown below. We now have twenty-four battleships built or building, enough for three unit fleets, but we lack a sufficient number of battle-cruisers and the special types necessary to a fleet. Battle-cruisers are almost as necessary as battleships, and scouts are indispensable. Large, fast mechant vessels of the St. Louis class make excellent scouts, but we have not enough of them, and, therefore, must build vessels for that special work.

The unit battle fleet should be composed of:

8 Battleships, in two squadrons; speed 19 knots.
4 Battle-cruisers; speed 22 knots.
4 Scouts; speed 25 knots.
12 Destroyers, in two flotillas; speed 30 knots.
Colliers: number depending upon character of service required.
1 Supply and refrigerating ship.
1 Repair ship.
1 Hospital ship.

From the tactical point of view the proposed unit fleet has a powerful fighting line of heavy battleships. This type is now a well-established one. It is only necessary to say that in designing battleships the aim should be to make them, not equal, but superior in offensive and defensive power, to any foreign ships of the same

class. This, our oft-proclaimed traditional policy, has, at times, been sadly neglected, notably in the design of our Kearsarge, Alabama and Maine types, but, it is comforting to add, has been resurrected in our Connecticut type.

The second type of ship for the fleet is the "battle-cruiser." This term is used advisedly as being more appropriate than "armored cruiser," which, in these days, means any ship of six to sixteen thousand tons displacement with more or less light armor.

The squadron of "battle-cruisers," with a speed of twenty-two knots, and with armament and armor only a little inferior to that of battleships, would be a splendid "flying squadron" and could take its place in the line of battle with a good chance of success against most battleships of older construction. They could scout in force in the vicinity of the enemy's battle fleet; could bring the enemy to action and delay them until the slower battleships could come up—in other words, could force an action. In battle, with their superior speed, they could be maneuvered so as to take positions of advantage not possible for the slower battleships. They could hang on the flank of an enemy's superior but slower force, and, of course, could overtake and destroy protected and so-called armored cruisers. We have an excellent type of ship of this class in our Washington and Tennessee.

The "scout" has not yet been fully developed in any service, but in future warfare it will be a very necessary class of vessel. In some respects no better scouts than the battle-cruisers could be desired for scouting purposes, but as those vessels cost as much or more than battleships, it is obviously impracticable to obtain a sufficient number of them. Another point to be considered is the necessity for very speedy, light vessels to operate against torpedo-boats and destroyers. It is proposed, therefore, to create a type of ship which can do duty as the "eyes of the fleet," serve as despatch vessels, and protect the heavy vessels from the attack of torpedo vessels. A vessel of the general character of the new British "scouts," but with more small guns and more coal-carrying capacity would serve the purpose admirably. Such a vessel would have the following characteristics:

Displacement	3500 tons.
Speed	25 knots.
Coal	800 tons.
Battery	2 5-inch R. F. G. 16 14-pounders. 4 torpedo tubes.

This vessel should be able to maintain a speed in a moderate sea that would enable her to overtake nominally faster destroyers, and to escape from heavier cruisers.

The destroyer type is quite indispensable to the battle fleet and should always accompany it. The importance of these swift little craft is so well understood that no discussion of the subject is required here.

Pursuing this policy there would be required to complete the three battle fleets already provided for in part, and for two additional unit fleets:

16 Battleships.
12 Battle-cruisers.
20 Scouts.
44 Destroyers.

This would give the following totals:

40 Battleships.
20 Battle-cruisers.
20 Scouts.
60 Destroyers.

This proposed increase, if made immediately, would place us second in naval rank; but the building of sixteen battleships and twelve battle-cruisers could not be undertaken at once. It would be necessary to spread the programme over a certain number of years, probably four. The laying down of four battleships, three battle-cruisers, five scouts, and twelve destroyers each year for four years would be a reasonable programme, and would give us the full strength of five unit battle fleets by 1912 or 1913. Some such programme is imperatively necessary if we are to hold our own with the rest of the world.

In a few years provision must be made for keeping the fleet up to the standard by replacing obsolete and worn-out vessels with new ones. This should be done by squadrons also, to as great an extent as possible. One ship of a squadron of the same age will, in some cases, outlast her sisters, but there can be no great difference in the life of similar ships if they have been employed under exactly similar conditions and have always been well cared for.

It is a mistake to build ships which have not a real military value, because it is an unnecessary extravagance in money, men

and officers. For example, our so-called training vessels are of no use whatever in time of war, and of very little, if any, in time of peace. They should have no place in our organization. Every ship should be of such type and efficiency as to be of material value in action.

Fast, heavily-armed, well-protected cruisers, perfect in their appointments, are better vessels to show the flag in foreign ports, to visit scenes of disturbance, and for training men than the nondescript cruisers and gunboats now employed for such work. The more imposing the type of vessel the better impression will be created in a foreign port, because such a vessel not only represents power but is a power. This moderate-sized, habitable, comfortable and efficient cruiser would be by far the most effective type of training vessel. We might not be able to obtain as many such vessels as of the smaller and inferior types, but each and every one of the former would be worth several of the latter in action.

It is proposed, therefore, that, as we add to our cruiser (training) fleet or replace old cruisers and gunboats, we build squadrons of protected cruisers of moderate size of the very highest type. These, with a few light-draft gunboats, are all that would be necessary as seagoing vessels in addition to our battle fleets. The types suggested are improved Olympia for the cruiser class, and a fast, habitable type of gunboat with a numerous but light battery.

The general characteristics of these vessels should be:

IMPROVED OLYMPIA TYPE.

Displacement	6500 tons.
Speed (maximum)	22 knots.
Battery	4 8-inch R. F. G. 10 6-inch R. F. G. 8 3-inch R. F. G. 2 torpedo tubes, submerged.

NEW GUNBOAT TYPE.

Displacement	1500 tons.
Speed (maximum)	20 knots.
Battery	8 4-inch R. F. G. 4 6-pounders.

The coast-defense squadrons, which will be made up of obsolete battleships, and cruisers, monitors, torpedo-boats, etc., could have little homogeneity and little effectiveness, all of which is a

matter of little importance, since the nation's real defense is in her battle fleet, which, if of adequate size and efficiency, would never permit an enemy to approach the coast.

ENLISTED PERSONNEL.

Perhaps no question affecting our naval establishment has been more thoroughly discussed than the recruiting and training of enlisted men, and certainly there is no question on which officers are less agreed than as to the best and most practicable methods for obtaining a well-trained personnel. That the present system is, in many respects, unsatisfactory is evident to all, and that in the present system certain fundamental conditions are lost sight of, is becoming apparent.

Some of the most noteworthy defects of our system are that we find it difficult to enlist desirable men in sufficient numbers to man the fleet; that a large percentage desert; that a very small proportion of those who serve a full term re-enlist; and that we have no adequate facilities for training recruits. Evidently there is something very wrong with the system. Any system that does not insure a full complement of well-trained men for every ship of the navy is unsatisfactory; and any system that does not provide a trained reserve is not what it should be.

In considering this question the political, social and economic conditions of the country must be taken into account; these conditions are vastly different from those obtaining in foreign countries, hence we can get little help from the study of methods employed abroad. We have not even much useful experience of our own service to fall back upon because conditions in America and in our service have changed greatly in late years. We can arrive at logical conclusions only by careful analysis of the present conditions and applying suitable remedies where needed.

That the apprentice training system, on which for many years we have relied for our trained men, is excellent theoretically is beyond question. The claims made for it by its champions are so well known as to render an enumeration of its supposed virtues unnecessary. What we have actually gained, and what we are now getting, from that system is what concerns us. It has been on trial so long as to have established itself as a success or as a failure. If it has proved a failure for practical purposes it should be abandoned. We must be practical at any cost—even the cost of losing a system theoretically perfect.

Some of the best men in the service to-day are apprentices or ex-apprentices, but they are very few in number. In fact only seven or eight per cent of the boys trained in our very expensive apprentice system remain in the service. This fact more than any other proves its failure. It is simply too expensive and takes too many officers and men from the general service to justify its continuance. The statement is often made that, in addition to furnishing this small proportion of men to the service, the apprentice system trains a large body of men who, though in civil life, are something of a naval reserve in time of war. This is highly problematical, especially when one considers that men must be kept constantly under training to be efficient. At any rate the government has no real hold on the men who have left the service, and even in the event of war would probably deem it not worth while to compel them to return.

Another strong objection to apprentices on board a regular man-of-war is that for a considerable period of their enlistment they are too young and too undeveloped to do a man's work. It is almost unnecessary to add that in our ships which are, at best, provided with too small a complement, a man or boy who cannot do a man's work is undesirable.

As a rule apprentices have not a strong sense of duty and responsibility, and it is well known that, in proportion to their number, they commit far more infractions of law and regulations than any class of men on board ship.

As stated above, there are some excellent apprentices and ex-apprentices, men whom it is a pleasure to serve with, and it would be manifestly unfair to condemn, in its entirety, the system under which they were developed, but we cannot be satisfied with the general results. There are several good reasons for the failure of the system. The boys are taken into service before they are old enough to know their own mind; they are trained in obsolete ships; many are educated out of the service, that is, they discover that their naval training fits them for more remunerative work on shore; and many others leave the service from sheer restlessness which is characteristic of the American youth.

The "Landsman for Training" system, the newer and only other source of trained men, has not yet been developed, and has thus far been handicapped by inadequate methods and means of

training. It would be unfair to criticise a system which as yet has not had time to establish itself. It seems reasonable to expect that, given the same care and attention as the apprentice system has received, it might be much more successful.

There is at present too little in the life of the enlisted man to appeal to the wide-awake, ambitious American youth. There is no very bright future for him. Many young men of good character do enlist, usually with the idea of seeing the world, for the benefit of the training, or from some romantic notion of going to sea. He quickly loses his illusions; he may see some of the world, but it is usually at long range, through a port-hole; the romance soon wears off, he becomes dissatisfied, homesick, discouraged. Let us consider the case from his point of view. He enlisted with the idea of going to sea in one of the splendid battleships or cruisers. He is sent to a training station for several months; this preliminary training course is necessary; he is well taken care of, and he accepts it cheerfully, but looks forward to the realization of his ideals. Next he is drafted to a training-ship (?) and it at once dawns upon him that something is wrong; he finds that the ship is obsolete; that she in no way resembles the modern man-of-war; the ship is overcrowded and uncomfortable, poorly lighted. The main idea of the cruise appears to be to keep as far as possible from attractive ports. The routine is irksome. He has little shore leave, and very little spending money. Next, if he has refrained from running away, he is drafted to a gunboat, a cruiser, or a battleship; his previous experience has been so unsatisfactory that he is now prepared to be dissatisfied with any ship, and, although he is at last in a regular vessel, he is now beginning to realize the disadvantages of life in the navy. He falls into the habit of comparing his lot with that of his brother in civil life who is in the employ of a great corporation; his brother's pay is five times his own; his brother enjoys the comforts of home and has sixteen hours each day during which he is his own master.

Of course, the foregoing is only the view of what is generally termed a disgruntled youngster whom we are often pleased to say is far better off in every respect in the navy than before he enlisted; but it is a view to be considered, nevertheless, and, if we stop to consider carefully, there is much to be said for his view. With all his preconceived ideas of personal liberty, he

cannot tolerate dull routine and the discomforts of ship life indefinitely with no prospect of improving his condition. He will not be content with a "few hours" liberty once or twice a week. If he is the average American he prefers to enter into the strife of the industrial and commercial world, in which he feels that he has a fighting chance to rise to fame or wealth. The peculiarity of our political and industrial system is that the best man wins regardless of his antecedents and every American feels that he has a chance. There are exceptions, many of them, but these exceptions constitute a class of men that, in a majority of cases, we cannot but believe is undesirable for the handling of the delicate and complicated mechanism to be found in the modern ship.

There is another feature of naval life seldom, if ever, considered in relation to the enlisted man, but which is an important factor to be taken into consideration; and that is, that the average man looks forward to the time when he may have a home and family. This idea is as old as the history of man and it is not to be lightly set aside, and yet it is almost an impossibility for an enlisted man to fulfill this law of nature.

In short, Americans are too prosperous and too contented with their lot on shore to feel the necessity, or the desirability, of going to sea in a service which, however favorably it may compare with foreign navies, offers many discomforts and few inducements. Furthermore, Americans do not generally recognize the necessity of a peace armament, though they are ready and eager to rally in defense of the flag when war is upon them; they are not a military people in the sense that they are willing to remain in service during the better part of their life.

How different are conditions abroad. England has her class distinctions and social barriers which operate to deaden ambition in her lower and poorer classes, with the consequence that her humble young men, with no hope of rising in the world, are willing to go to sea, realizing that they are better cared for in the British navy than in their own sphere at home. France and Germany have no difficulty in manning their fleets for the reason that they have conscription, a condition that can never obtain in America. In autocratic Russia nearly all eligible men are either sailors or soldiers.

Only America, with her eighty millions of people and her great national wealth, finds difficulty in enlisting and retaining the men

required for her comparatively small fleet, and a careful analysis of the subject shows good reasons for this condition.

The question of early training of men for the navy always evokes much discussion as to ways and means, and the opinions advanced by officers are always very positive. It is probably owing to this fact that we are now building two cruising sailing ships with which to carry out one method of training, and a type of training brigantine, new to our service, in deference to the ideas of another faction. These will add two new types to our so-called training squadron. What can be more futile than a policy of expediency which apparently endeavors to please all and, as we are beginning to realize, serves no useful purpose. In short, there is absolutely no system, and conditions are going from bad to worse as our navy expands.

A simple problem in arithmetic will show the impracticability of training our recruits in sailing ships. By the time all ships now under construction are authorized, we will need about 30,000 men of the seaman branch; the average term of service at present is about three years; therefore on that basis we must train at least 10,000 men per year to keep the fleet manned. With a better system the number of desertions and discharges would probably be reduced very materially, but for the purpose of this discussion we must start with existing conditions. In the new 1800-ton sailing ships we cannot hope to accommodate more than 250 recruits at a time. Supposing that each training ship could make two cruises each year, taking a new draft of recruits each cruise, it would require twenty ships to give 10,000 recruits a short training cruise. Taking into account the desertion of men under training, and other contingencies, it would probably require twenty-five ships to carry out the system. This represents not only a large initial outlay of money and a large annual expense but it means also that at least two hundred line officers, and twenty-five hundred enlisted men (petty officers, drill-masters, and the nucleus of the crew) must be withdrawn from the regular fleet. Furthermore these twenty-five ships would be of absolutely no value in time of war. It seems almost beyond belief that such a system could be seriously considered in a country which prides itself on its good business sense.

Men for the navy should be enlisted between the ages of eighteen and twenty-two. It makes no difference whether they come

from the interior or the seaboard as long as they are sound mentally, morally, and physically. It is not a question of enlisting sailors, for there are no longer many American sailors whom it is desirable to enlist. It is as well that they should be the bright, wide-awake young men of the cities or the sturdy youth of the country. A mechanical turn of mind is more desirable in the recruit for the modern navy than an indifferent knowledge of seamanship—if these two very important qualifications are to be compared—because modern seamanship and gunnery are decidedly mechanical, just as different in character from the older seamanship as the steam engine or the electric motor is from sails or hand-power.

By fixing the minimum age of admission into the navy at eighteen years several advantages are obtained over a system in which the age limit is lower. By the time the American youth has reached the age of eighteen he has not only had a fair amount of schooling but has seen something of the practical hardships and difficulties attending life on shore. He has had enough experience to enable him to realize the benefits and advantages of life in the navy, and he goes into his new life without regret at shaking off the old. He is more amenable to discipline and, being able to do a man's work, is a valuable man from the very beginning, even while under training. Being more mature, he has lost the childish traits so conspicuous in apprentices, while he is not yet beyond the receptive state. There can be little doubt that a young man of eighteen to twenty will advance much more quickly in his work than a young boy.

In connection with the recruiting of new men, it is very important that the recruit should enter the service with his eyes open. At present too many enter with false ideas of life on shipboard and their future status, with the result that they are dissatisfied from the beginning. This is undoubtedly the cause of a large number of desertions. The remedy for this is greater care on the part of recruiting officers, and in a widely disseminated literature on the subject of life in the navy. It would seem advisable that booklets, clearly setting forth the advantages and disadvantages of the life of the enlisted man, should be put into the hands of would-be recruits. Perhaps fewer enlistments would be made, but, in the end, the advantage would be with the Government, for it is a useless waste of money, time, and trouble

to pay and train men who, dissatisfied from the beginning, leave the service at the first opportunity, many of them by desertion.

All recruits should be given a preliminary training on shore of at least four months and not more than six, the training to consist principally of discipline, setting up, gymnasium work, care of person and clothing, and the rudiments of the duties of the branch in which they enlisted. In this connection no instruction can be of greater benefit to the recruit than infantry drill; it is one of the best setting-up exercises, and better still, inculcates a strong sense of discipline and smartness.

From considerations of economy, administration, and facilities for instruction, the training station should be at the home base. This being the place where the recruit gains his first impressions of his new life, every comfort and indulgence consistent with strict discipline and efficiency should be provided. The recruit must be made to feel the advantages of his new life.

There should be commodious barracks, well ventilated, well lighted, and constructed with a view to convenience, comfort, and a proper enforcement of military discipline. Near by should be athletic grounds, a gymnasium, swimming pool, baths, reading rooms, and canteen. All parts of the station should be as attractive as possible, with a park, shady walks, music during recreation hours, and boats for the use of the men.

Athletics should be encouraged, especially boat racing, football, baseball, field sports, and other games inculcating a spirit of emulation. The young man who is kept constantly employed, at work or at play, with not too much of one or the other, is the healthiest and most contented, and he will not chafe at strict discipline and hard work if he has compensations.

The process of weeding out the undesirable men should begin as soon as possible after the recruits are received at the station; it is very necessary that no undesirable men should ever get into the regular vessels of the navy, where they are nothing more or less than a contaminating influence on the rest of the crew. If we can get rid of the vicious, the immoral, and the drunkard, we can soon raise the status of the enlisted men to the position it should occupy; the higher his status the better will be the class of men seeking admission into the service.

For the purpose of teaching the recruit the rudiments of seamanship there should be attached to the station a number of

steam vessels of small size. The smaller converted yachts would serve the purpose very well.

Assuming that 12,000 recruits must be drilled each year at six stations, and that there are half that number at the station at one time, the maximum number to be drilled in seamanship each day (two days' drill each week) would be 400. Four vessels could easily accommodate this number, and these four vessels would constitute a miniature squadron in which the recruits would be given individual instruction in steering, signalling, the compass, the use of the lead and log lines, anchors and anchor gear, etc., and such instruction would be carried out in such a manner as to stimulate the interest of all hands. For such drills each vessel might well be under the command of a young officer who himself would derive the greatest benefit from the experience thus afforded. The instruction of the men should be supervised by drill-masters and responsible petty officers. In addition to this instruction in vessels underway, recruits should, of course, be given frequent instruction in boats under oars and sails, and work in the rigging loft.

Preliminary instruction in gunnery should be had on shore at a well-equipped battery composed of the types of guns in use on board ships of the cruiser squadron to which the classes under instruction are to be drafted. In this work there should be no tedious oral instruction. The idea should be at first to get the men interested in the use of the guns, and the best way to do this is with sub-caliber practice, first at a stationary target and afterwards at a moving target. To teach the men the nomenclature of guns and mounts each part might be marked conspicuously with its name; men may be trusted to pick up quickly the names of tools with which they work, especially if they are kept interested.

The mistake should not be made of expecting too much of the recruit, but in a four months' course of training the average man will readily acquire sufficient knowledge of the duties of a seaman to make him a useful man on board ship.

Attached to the home base should be squadrons of regular cruisers to which the recruit is drafted on the completion of his preliminary training. The complements of these cruisers should be made up half of well-trained men and half of men under training. With efficient officers and petty officers these vessels would

undoubtedly prove to be the best school for the seaman; there is no school equal to that of precept, and in a taut ship half of whose crew are competent seamen, the newer half would necessarily be very quick to learn.

The cruiser squadron should always remain attached to its home station, but, of course, would be called upon to cruise to any part of the world. It is not necessary, however, that such squadrons should remain permanently on foreign stations, but at the end of a year's cruise they should return to the home base and, after transferring half its crew to the battle squadron, take a new lot of recruits and make another cruise.

Under this system, therefore, a man serves four to six months at the training station, one year under training in the cruiser squadrons, and is then transferred to the battle fleet. He has had a pleasant schooling at the training station, an interesting cruise abroad in a regular ship of the navy, and has been promoted to battleship duty.

The training of the seaman is only a part of the system; petty officers must have advanced courses of training; firemen, machinists, electricians, and others of the artificer and special branches must undergo instruction.

At the training station should be a school for petty officers. This is for men who have completed their battleship cruise and have been selected on their merits as candidates for permanent appointment as petty officers. At this school, they should be made to acquire a certain class-feeling as well as greater knowledge of their duties, so that when they go to a ship they will bear themselves with a certain dignity, pride of position and authority in dealing with their subordinates. The petty or noncommissioned officer should be the backbone of the service. At present we have few capable petty officers and it is all the fault of our lack of system.

Recruits of the artificer and other special branches should be trained in courses parallel with that of seamen. Coal passers, firemen and machinists should have their four months at the training station, getting instruction in their particular work in the station training vessels and in the shops of the home base.

Electricians could put in their four months to advantage as assistants in the electrical plant of the station. Yeomen should have a preliminary training as assistants in the station offices, and so on throughout the special ratings.

The training of men of all ratings should be under the administration, first of the particular part of the General Staff having cognizance of the personnel, and second, of the superintendent of the training station, in order that all training stations might have the same methods and the same standards.

Any system of naval organization should include the means for the thorough, progressive, and systematic training of the officer. From the time he enters the Naval Academy until he arrives at flag rank, the modern naval officer must be a student as well as a thorough practical seaman if he is to keep pace with his profession. There is no class of men in the world which is called upon for more diversified knowledge than the officers of the navy of to-day; and all this knowledge must be combined with great resourcefulness, energy, and address, to enable them to meet all the requirements of the service.

Present conditions leave much to be desired. The navy is very short of officers. In consequence, selection at the Naval Academy cannot be carried out as thoroughly as might be desired; many midshipmen go direct from the Academy to duty as watch and division officers without adequate training for the responsibilities thrust upon them. From this point onward, there seems to be no system whatever governing the assignment of officers to duty.

The urgent necessity for an increase in the number of officers for our growing fleet has been tardily recognized by Congress, but years must elapse before the bad effects of the present shortage can be eliminated.

Under any rational scheme of naval expansion the addition of a ship to the navy list would carry with it a proportionate increase of officers and enlisted men, to be trained and ready for service by the time the new ship was commissioned. But we have no naval policy and the efficiency of the service must suffer; and right here let it be predicted that when our under-manned, under-officered, unprepared fleet goes into action against a highly-organized enemy, the blame for defeat will be laid on the officers themselves and not on those whose duty it is to give us officers and men and adequate preparation. Public opinion is elemental and not analytical in approval or condemnation.

Under an effective organization and administration of the

navy, a system might be worked out somewhat on the following lines:

The age of admission of midshipmen to the Naval Academy should be lowered and the course lengthened to five years. The present course is too crowded, yet we cannot afford to omit any of it. The naval officer must be a well-educated man and the groundwork of his education cannot be too thorough. There should be a three-months' practice cruise each year, so planned and carried out as to give the midshipman the greatest amount of practical training.

Upon graduation the midshipman should be commissioned as an ensign and assigned to junior officers' duty for one year in the battleships or battle-cruisers. These ships, being of the very highest type, and the best disciplined, furnish the best possible school for the newly-commissioned officer who is now receiving his first and most lasting impressions of the service, its discipline, and the art of commanding enlisted men.

Having served a year as a junior officer of a division in a battleship, he should be qualified for duty as a regular watch and division officer in a gunboat or small cruiser. He has had, by this time, sufficient experience to fit him to command men and gain their respect and ready obedience, without which no officer can be successful.

The young officer's next duty should be instruction at the torpedo school followed by a few months' work in torpedo-boats. The torpedo is becoming a very important weapon and its use should be thoroughly understood by all line officers, while the torpedo-boat is one of the best possible schools in seamanship for the officer. When champions of the old system of training lament the passing of sails and spars, they forget, or do not realize, that in the torpedo flotilla we have a new school superior to the old in every respect, one requiring the greatest possible nerve, skill, resourcefulness and energy, combined with alertness, keen judgment and knowledge of one's crew and vessel. There is no more necessity for the sailing ship, to train officers, than for a Phœnician galley, but we have been many years working towards that idea. In this connection it may be explained that it is not to be expected that every officer can be a good torpedo officer, but every officer should have a reasonable knowledge of the usefulness and the defects of this important weapon.

The experience and skill acquired in all this preliminary training has made the officer eligible for watch and division duty in the larger cruisers, and in battleships. There is no more important duty in the entire service than the command of a gun division in a battleship until the officer reaches command rank. It is he who trains the men of the real fighting ship, the ships of the line of battle, upon which may depend the result of a war. It is at this point in the career of the officer that a process of selection might well be adopted to secure the very best officers for especially important duty. The difficulty of putting such a system into effect would be great, but not insurmountable. There would seem to be nothing more reasonable than to select officers for duty according to their qualifications. The advancement of the naval officer should be in accordance with the principle of the survival of the fittest. Promotion by selection in our service is quite generally believed to be impracticable, but selection for particular duty should be possible.

The subsequent career of the officer should include duty as gunnery officer, navigator, and executive before reaching the command of a large and important ship.

As regards shore duty, there are many important posts on shore which can best be filled by naval officers as being the only ones qualified for the positions. Our present system of alternating shore duty with cruises is a good one, and, from the officer's point of view, the only one bearable, as naval officers are only human and cannot entirely cut home ties; but, under the foregoing plan for the organization of the fleet and the home base system, shore duty will be much less sought after than at present, for the reason that during six months of the year the squadrons (except the cruiser or training squadron) would be at, or near, the home base, and the desirability of shore duty would not be so real.

In the preceding pages it has been both impracticable and unnecessary to go into details showing the need of organization and in outlining a systematic naval policy. Many of the ideas expressed are familiar to every officer; many of the statements made are self-evident truths; but the attempt has been made to gather these ideas together into a composite whole, forming a system at once practical, harmonious, and efficient, and easily applicable without violently disturbing the present organization.

Given the co-ordinating power of a General Staff, the change to the new system should be gradual and easy.

Undoubtedly many officers will disagree with the writer on some parts of the proposed system. If so, it is hoped they will respond to this mild challenge of their views, to the end that a wide discussion of this broad and important subject may be awakened. It must be recognized that we are getting to be too great a world-power and our navy of too great importance to permit of the continuation of haphazard policies of expediency. We must bring every ship and every gun to the highest possible state of efficiency, and only by organized and systematic effort can this work be accomplished.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

HONORABLE MENTION.

A PLEA FOR A HIGHER PHYSICAL, MORAL, AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY.

By MEDICAL INSPECTOR HOWARD E. AMES, U. S. N.

MOTTO: *"The mind has no right to build itself up at the expense of the body; it is no more justifiable in abandoning itself without restraint to its cravings, than the body in yielding itself to sensual indulgence."*—DR. W. MATTHEWS.

Under the title this essay is submitted for the purpose of placing it in a light that it may be viewed by the whole service from a point which has, to my knowledge, been singularly overlooked—or escaped attention. After a careful search in the PROCEEDINGS of this Institute, or, in fact, any present or past naval literature, I have failed to find a paper that treats the subject from a military-medical standpoint.

It is with the gravest feelings of apprehension that I present my views, conscious that they can only be clearly understood by the reader by candid, open statements on the part of the writer. To render justice to my subject, freedom of opinion and expression must be granted the essayist. I admit I shrank from the subject when I felt that frankness of opinion and expression might, seemingly, sound like censure or fault-finding over the opinion and decisions of those higher in authority, with longer experience, greater knowledge, and broader views. I was impelled, and flattered, perhaps, with the feeling, egotistical though it may sound, that it was my duty to the country and the service to give my accumulated thoughts of many years upon the subject to my brother-officers and shipmates in the navy.

When one considers the vast amount of money already expended in the naval establishment, and the large yearly appropriation for its maintenance, we naturally ask, For what is all this? The answer is simple: it is for specific purpose only; it is a special provision for the maintenance of our national existence, for the preservation of our position in the world, for the protection of our people's lives, for the defense of their homes, their rights, and their liberties. It is for the purpose of assisting the nation in maintaining the civilization of the world and progressively elevating it to a higher intellectual plane, and bringing the nobler attributes of being, nearer in keeping with the divine laws that man inherits from the Almighty. It is one arm of the political body which constitutes the nation; its functions are limited, but must act in unison with every other part of the whole; and, with the army, forms the military, fighting or physical element. Its life and operation are controlled and directed by the intellectual parts comprising the legislative executive and judicial. These we serve, and, with the financial, educational, agricultural and commercial, give strength to this tripod upon which our country and government are built.

We may compare, roughly, the national to the human body, consisting of two fundamental requirements: brain and brawn. We belong to the brawn, or the fighting, portion of the nation; of which we are one of the arms, and which we are to consider. Our movements, maintenance, and actions are controlled by the brain, and, in return, protect the brain part from injury, by a stalwart defense, from any source or direction, that may menace in any way our national life. This is a crude, but apt, illustration of the navy's duty in the work of our political life.

For convenience' sake I have used brawn, to separate the military from the civic body. In other words, the fighting in contradistinction to the peaceful element. Now, it is self-evident that no duty or function can be properly performed if not properly directed. Brain and brawn must be carefully proportioned to answer demands upon either; if this proportion or combination be not maintained, the result will be a failure. Intellectual strength, or physical force, alone will not do for a national existence; the removal of either will result in failure. A careful study of history will prove that such is the case. You will interrupt right here by confronting me with that majestic ideal, arbitration.

Arbitration, I admit, is still the goal we are seeking to gain; it is in sight, but still far off; let us pray that our pace toward it may be quickened. In our journey toward it we must not throw down our warlike equipments to move the more quickly, as there is still savage territory to be traversed; and intellectual rewards and divine hopes have not been evenly distributed through the civilized nations of the world, and the science of politics varies greatly in its application among the various nations. Holding this view, I must dismiss arbitration from the discussion, and assume that such does not exist.

The history of Sparta teaches us one side of the question: that the single idea of Brawn as the dominant power will not produce stability, advancement, or secure endurance of a government. By neglecting the intellectual portions, she became a stationary and degraded nation. A false idea led to her downfall; she never saw beyond physical development, courage, and simple tactics.

Athens, on the other hand, demonstrated the other extreme: her wonderful intellectual powers elevated every art and science. She studied war and raised that into a science; her brain power dominated the physical features; she theorized and made improvements, and brought the intellectual character of the art of war to a high plane, but she did not practice her theories—and fell, through intellectual strength and physical weakness.

Alexander and Napoleon were wonderful warriors, but poor statesmen. Their lives and exploits were brilliant; they have left us wonderful lessons, worthy of the deepest study, but their politics were not stable. Genius is an ephemeral product never lasting. Extremes are valuable as they enable us to secure the golden mean, the most valuable unit in the field of measurement, which is the greatest single factor in science to-day.

If we study the history of the navy from its birth to the present time, we will find that it has fluctuated very markedly in its quality; it is not so easy to trace its faults or blunders as its successes. It is a difficult and humiliating task to confess one's faults; it requires a peculiar quality and amount of mental courage for one to openly proclaim to the world one's weakness, to acknowledge one's blunders, or to admit one is not such a paragon as the world stamps him. In a large body this individual characteristic of concealment is found to exist and generally dominates. Flattery is rarely repelled, though its intent may be

fully understood; it is pleasant and, sometimes, harmless—not often beneficial. Encouragement is never amiss. Censure is seldom gracefully received, and rarely admitted as merited. Excuses are magnified and given more thought than any other character of the mind. Success is often due to the blunders of others; when this happens, we never lay bare our mistakes, but rather hide them, and in this we easily secure the support of those who receive the reflected light of commendation. To hide one's weakness from an enemy is a virtue; to keep it from our friends is an error.

It is pathetic to read the history of our naval establishment and the thin, weak-voiced recommendations or opinions of the necessity of a system or school of instruction for our naval officers. Thirty-eight years of repeated recommendations, some feebly made, others strongly put, each successive one either raising or depressing hopes among the few well-wishers, never crushed their endeavors, but often sorely tried them. Such sentences as "I would suggest the expediency of providing," "Suggest the importance of establishing," "It is intended as a mere suggestion of a measure deserving consideration." In one recommendation we find the following, "Recommendations have been so uniformly passed by, that it is with reluctance that the subject is again introduced."

It was a bold and memorable step when thirty-nine officers met on the Constitution and drew up a set of resolutions which were endorsed by eighteen others on the Vandalia, in which they set forth the need of a school or course of instruction for officers then in the navy. This petition and resolution came to naught, but it is a pleasure to see recorded names from all branches of the personnel, who saw the deplorable state of affairs, recognized the prevailing ignorance in the service and used their best efforts to improve it.

It was nine years after this meeting, the Academy was founded by the Hon. George Bancroft; and fifty years after the birth of the Navy Department, before we meet with any encouraging outlook for raising the intellectual status of the navy. Before this it was a haphazard affair, hit or miss. The midshipmen were from all walks of life, with meagre education, with no means to improve their minds; they entered at too early an age, which precluded any knowledge beyond the most rudimentary. Their

duties and the moral atmosphere in our ships were not conducive to studious habits; so that many of the older officers were ill-fitted, so far as educational qualifications, for the position they held. Up to 1845, there was no law relative to appointments of midshipmen. "The Department appointed whom it pleased, and as many as it pleased, without any law whatever to guide or regulate its judgment." In 1845, it was provided by Congress that midshipmen should be appointed from each State or Territory in proportion to the number of Representatives and Delegates, the appointee being an actual resident of the State from which he was appointed. This was modified in 1852, so that no one could be appointed except on the recommendation of the member of Congress representing the district in which the applicant lived. It is surprising that, up to the founding of the Academy, no intellectual, physical or moral qualifications were demanded; no set course of studies, or length of time. It was a start, however chaotic as it seems now; it was a wonderful advance over the previous fifty years.

No individual deserves the lasting gratitude of the navy more than the Hon. George Bancroft. His was a remarkable achievement in founding this school without legislative enactment: his intellectual inclinations, broad education, and scholarly insight caused its birth, and its interests were so stoutly defended and so ably managed in its infancy as to gradually force recognition and secure a legal status and governmental support through indirect legislation, so that it became an acknowledged national educational institution without a charter. This apparent digression has been necessary for the essayist, in order to start from some tangible point to intelligently support his theme.

The heritage of the navy can only fairly be dated from the foundation of the Academy; then only was it that the navy could truly lend a hand in guiding its policy. Previous to this the necessities for improvement were evident enough, but no favorable opportunity offered itself sufficiently backed by authority to make an impression; its officer personnel was a particularly difficult problem; advance was retarded, no doubt, by political appointments and administration pull, which dominated many who would rather sacrifice the service needs to secure government emoluments and personal comfort. Individual power was greater than now, for the absence of law on so many questions

made it difficult to urge anything that did not meet the approval of the senior officer. The intellectual or high-minded were few and far between. Individual oppression was easily sustained by individual interpretation of narrow and lax regulations; healthy criticism was suppressed; advice was rarely asked, and seldom followed. Servility was exacted from the men, and civility rare among the officers. Arrogance and dignity were not differentiated. Morality was suppressed. Depravity, licentiousness, intemperance, cruelty, tyranny, and all the lewd attributes of the mind prevailed.

There were many noble men who recognized the laxity and degradation and manfully fought to correct them; their endeavors were never checked, but their number was small and the intelligent leaven of their learning, teaching, and example was slow in imbuing, but it did work, not so freely as they wished, still sufficiently to have greatly influenced the tendency and strengthened the hands of the founder and friends of the present navy.

A study of the first set of regulations governing the school is remarkable, as it shows a markedly keen intellectual discernment of the needs of the naval officer in his future particular calling. It is, also, striking how few changes have been made in the original set; they are the most sagacious, and in spirit are the same to-day. The only question is, have we remained faithful to them? have we kept the intentions and motives true to the direction then pointed out? In the main, I believe we have; but in several particulars I think we have deviated, unintentionally, through force of opinion, or situation, and allowed a perversion of the principles laid down; which, if not checked, will further injure the service. The departure was so slight and at rare intervals at first, that its insidious growth was not noticed until its frequency and scope made it so bold as to attract attention.

Arrogant assumption is often the basis of illegal precedent; the higher the office of the violator, the more danger of its escaping detection, and the more likely that it will be repeated; either intentionally by those personally interested, or unintentionally through ignorance; and not rarely when its illegality is discovered, it is not an easy matter to check it; it is only when an injury is done or an injustice repeated that the question of legality is tested.

We have many examples in our service where violations of

justice and law have led to bitter legal fights, which have resulted in strong personal feelings and lasting enmity, even after decision has been rendered.

It is annoying to be called down from a self-built pedestal of assumed power, but it should not cause a shadow of resentment when one is reminded of his unintentionally overstepping the law and recalled within its boundaries, which is made for every one—exempting none.

If we examine the original plans for the naval school, we find the 6th paragraph reads, "Every applicant for admission to the school must be of good moral character, not less than thirteen, nor more than sixteen, years of age, and must be examined by the surgeon of the institution to ascertain if he be free from all deformity, deafness, nearness or other defects of sight, or disease or infirmity of any kind which would disqualify him from performing the active and arduous duties of sea-life. He must be able to read and write well and be familiar with geography and arithmetic. The Academic Board will examine him on these branches, and certify to his capacity for admission into the school." Here we find the three essential requirements of candidates for any school, but especially for a naval or military academy, as it demands brawn, brain, and the guiding spirit—the moral—which gives that grace and dignity to the body and mind, making their beauty approach nearer the transcendency of their Maker. These are so dependent upon one another, that any naval officer will fail in his duties if he does not possess them in fair proportions. This regulation was far-reaching and sagacious, and looked beyond the scholastic life, as shown in the words, "the active and arduous duties of a sea-life." The justness of these requirements needs no argument, but lest they be neglected, it was made imperative by legislative action (see Section 1515, Rev. Stat.); and further strengthened by repeating it in a subsequent statute originally intended to provide for a different matter (see Section 1516, Rev. Stat.). Through a non-specific statement, regarding the eligibility after the lapsing of Congressional appointments, we find that the physical standard of the candidate is emphatically strengthened. We find still another statute of great importance—Section 1519—which, no doubt, grew out of the attempt of the Secretary to set aside the findings of the Academic Board. It reads, "Naval cadets found deficient at any examination shall

not be continued at the Academy or in the services unless upon the recommendation of the Academic Board." (A foot-note is found that reads, "Leave no right in the Secretary of the Navy to continue at the Academy cadets who have been found, at any examination, deficient in their studies, without the recommendation of the Academic Board.")

In the original plans and in the statutes I have quoted, there is one factor that is repeatedly mentioned, and this, I find, is printed in every circular sent out regarding not only the midshipmen, but officers appointed from civil life; warrant officers and every sailor or person admitted into the naval service. In fact, it embraces the entire personnel; and that is the physical qualification. This is eminently proper, for I hold that the first requisite is Brawn; by which I mean a healthy, robust body, or normal physical condition. The demands of the service are of such nature that merely a normal body does not fill the requirements. "Good health is the basis of all physical, intellectual, moral, and spiritual development."

The navy, as I defined it, was for a specific purpose, in which the fighting quality is the first requisite.

The object of the physical examination is for the purpose of securing physical conditions of a certain standard. A very small man may be normal so far as health and function are concerned, but he would be unsuited for our purpose. On the other hand, a very large man might be anatomically perfect in build, but practically unsuited for the naval service through hereditary disease; or his physical development and functions perfect, but his mental state or morals render him unsuited for the service. An intellectual giant with illy-developed body would be equally unsuitable. We cannot indulge in extremes of any kind; it is the mean we seek and should constantly strive to secure. We cannot deal in averages or percental deductions; they are valuable statistics and guides, but are not yet of value for practical naval purposes. We want the body to stand the wear and tear of naval demands: "the hand that executes what the brain conceives." These functions to work in unison and to the best advantage. Wainwright says: "The best tactics have failed, at times, to win success, because of a change of circumstances or because of faulty instruments. And at times, hard fighting has prevented failures that were earned by faulty tactics." The former is an apt illustration of brain unable

to win through lack of brawn—the latter, brawn winning over brain.

It may be assumed that the qualities we seek in making officers for the navy can only be obtained by beginning at the foundation, —which is the Academy. The first step required is the physical examination; here we select the material from which the officers' personnel is to be supplied, and it is here the most careful selection must be made, the closest scrutiny, the most carefully considered points are to be conscientiously weighed and viewed from many sides. The slightest physical defects in the candidate demand careful investigation and thought; chances should not be taken, neither should possibilities be considered nor an unfavorable probability be allowed to sway our judgment in favor of the candidate. We must never lose sight that we are dealing with an immature mass of living matter, a growing youth at a critical point in his life, a transition period; the country is awaiting our decision as to whether he is fitted to enter on a moulding or training period of four years to fit him for those peculiar, varied, and arduous duties that are to control him in the future active work that will be given him.

The writer does not know how it impresses others than the military surgeon, but he knows of no duty in which one's professional conscience could be more severely tested than in the examination of candidates for military purposes, and particularly the Academy.

A personal experience, of 29 years, with officers who have gone through this school, professional knowledge of their ills and injuries, their physical defects, their mental weakness, their moral failings—all the accumulated observations of my naval experience impel me to endeavor to impress upon you the importance of this first step and the necessity of seeing that your scholastic officer is as the statute demands, "morally, physically, and mentally qualified for admission."

Let us take a momentary glance at the field covered by physical conditions: Life is but a continuous journey in one direction without a halt; it is always toward death; and although its rate of movement varies, still it never ceases but moves toward the one goal. During the whole life of a being, there is unceasing change; we can have no change without an expenditure of energy in the living body, this is vital force; so that every manifestation of life is but an exhibition of power. Our body is but a living machine

composed of wonderful and delicate parts, each dependent upon the other in the work required; it matters not whether it be tissues, bone, or organs—it is for work. Life has beeen expressed as "a state of dynamical equilibrium." But the vital force varies in growth and development, decline and decay, so that, strictly speaking, there is never perfect equilibrium, though we use it in argument.

It is plain that any vital organs or tissues which do work must sooner or later wear out, if not constantly supplied with nourishment. At certain periods of existence, the relation between waste and repair is different. In early life the increment must be greater than the loss, or there would be no growth; the reconstructed must be better than it was before, or we would not have healthy development. In the decline of life, this renewal is less than the destruction, or waste; then we find degeneration. We must, also, ever bear in mind that in the young the waste cannot exceed the supply without injury; if pushed beyond this, degeneration sets in. This dependence of vital power, or force, and supply, and its bearing on the management of the immatured body is, perhaps, well-known; but how few thoroughly grasp its meaning. Even those who know it, neglect its teachings in dealing with the educational training of our youth. Is it not our duty to give to succeeding generations sound bodies as well as intellectual minds if we wish to secure a successful and stable government? Let us apply this knowledge in our physical summing-up of the embryo naval officer.

I will quote in part an opinion of Captain Mahan relative to applicants: "A simple educational test was of no great value in discriminating between applicants; and that good health, wholesomeness and, where they can be ascertained, indications of pluck, perseverance, taking the lead in a manly, not a vicious, way among equals in age, were of more worth than intellectual forwardness, as showing the stuff of which a good officer could be made." He dwells upon the physical make-up. Relative to the mental stand-point which is so apt to blind us to physical defects he says, "nevertheless the instructor, like other men, tends to magnify his office and to mistake mental acquirements, which are simply means to an end." Here we have the opinion of one whose mature thoughts have been acquired through nearly a half-century of study and observation, and they cannot be lightly passed by; for

so eminent an authority on naval affairs is not likely to put thoughts on paper without the most careful consideration. So I make bold to use his opinion to support my argument.

About ten years ago, Dr. W. T. Porter, after careful investigation, stated that precocious children were heavier than the dull ones. Investigation since, though not so full or exhaustive as we would wish, sustains this idea; in fact, we may go a step further and say that the physical and mental development go hand in hand through life.* This should be our guide in the selecting of applicants for the Academy.

One great defect that has existed, and continues to exist at the present moment, is the lack of a proper standard for the admission of cadets. "Physical soundness" is a vague condition in some respects and leaves open many questions that are of the greatest importance; such as weight for age, weight for height, height for age, chest measure for age. The limits, as now given, are too broad and not finely enough adjusted. There is, unfortunately, no law regarding these factors, which are of the greatest importance in measuring the physical qualifications of the candidate. The circulars sent out by the Department have varied, and none of them were based on a careful study of the subject in its ultimate bearing on the needs of the service; and I do not hesitate to say that the matter to-day is in a most unsatisfactory state, and gradually growing worse. It seems to me that it is imperatively demanded that the whole subject of physical requirements be thoughtfully considered by a board of officers, carefully selected from the medical and line officers of the navy, to study the matter in all its bearings, and from their report a standard fixed which, after careful consideration by higher authority, should be adopted and made binding by legislative enactment.

As the law now stands, only the age limit—(16 years the minimum, 20 the maximum, to take effect January, 1904), and a phy-

*This, I think, is well proven by a study of the numerous and careful observations made by Surgeon H. C. Beyer, whose deductions are of the utmost value. His studies in Anthropology particularly, in relation to the Navy, are the most valuable we have in the service and can not be too highly praised; and I cannot refrain from mentioning and calling attention to the immense labor that lies hidden in his numerous articles, which convey but the faintest idea of the really thoughtful, scientific labor expended.

sical examination are specified. Sec. 1515 R. S., July, 1862 and April, 1866—seems to give the Secretary of Navy the authority to change the examinations at any time. I admit I am not sufficiently versed in the law to interpret just what this does mean; but subsequent legislation seems to limit his power to the course of study, as the physical examination is still insisted upon, and in one statute which has only been modified in regard to age limit, it strengthens the others by using the words, "physically sound, well-formed, and of robust constitution." We find in the regulations governing the admission of candidates—March, 1903, the following which are, no doubt, issued by the Secretary of the Navy.* Here is a set of requirements that should, apparently,

* Candidates will be examined physically at the Naval Academy, by a board composed of three medical officers of the Navy. Any one of the following conditions will be sufficient to cause the rejection of a candidate viz.:

Feeble constitution, inherited or acquired;

Retarded development;

Impaired general health;

Decided cachexia, diathesis, or predisposition;

Any disease, deformity, or result of injury that would impair efficiency; such as—

Weak or disordered intellect;

Cutaneous or communicable disease;

Unnatural curvature of the spine, torticollis, or other deformity;

Inefficiency of either of the extremities or large articulations from any cause;

Epilepsy or other convulsions within five years;

Impaired vision, disease of the organs of vision, imperfect color sense; visual acuteness must be normal in both eyes;

Impaired hearing or disease of the ear;

Chronic nasal catarrh, ozæna, polypi, or great enlargement of the tonsils;

Impediment of speech to such an extent as to impair efficiency in the performance of duty;

Disease of heart or lungs or decided indications of liability to cardiac or pulmonary affections;

Hernia, complete or incomplete, and undescended testis;

Varicocele, sarcocele, hydrocele, stricture, fistula, hemorrhoids, or varicose veins of lower limbs;

Disease of the genito-urinary organs;

Chronic ulcers, ingrowing nails, large bunions, or other deformity of the feet;

Loss of many teeth, or teeth generally unsound;

Attention will also be paid to the stature of the candidate, and no one *manifestly* under size for his age will be received at the Academy. In the

surely satisfy the most exacting physical examiner; and there are but few criticisms or suggestions that can be made to this list. The fixing of the minimum height at five feet, and the failure to give the ratio between these factors, I have already mentioned. One might argue that those are provided for in the 2nd condition: "Retarded development," or in first sentence of the last paragraph—"Attention will also be paid to the stature of the candidate and no one *manifestly* under-sized for his age will be received at the Academy." Or the 2nd sentence: "In the case of doubt about the physical condition of the candidate, any marked deviation from the usual standard of height or weight will add materially to the consideration for rejection." The final sentence, it seems to me, emasculates or nullifies the whole—"Five feet will be the minimum height for the candidate."

Under general remarks I find additional advice in paragraph 3: "A sound body and constitution"—"and a correct moral deportment," &c., &c. I am not bold enough to paraphrase these statutes, so leave that for an abler pen; but I am at loss how to reconcile the apparent positiveness of some of them and the actual results that have been attained from their partial application. They seem mandatory in their reading, and I supposed until lately that they were legislative; but I am in grave doubt. It matters not whether my personal opinions be correct regarding them; my primary object is to endeavor to call attention to the effects that their present contradictory interpretation is having on the service.

Captain Goodrich in his essay on "Esprit de Corps" in reply to the question, "What was the fundamental motive that governed England's leaders?" answers "Loyalty to the Crown." Again he says—"This general rule of conduct will be admitted by officers, without exception, as admirable and exact. It is a truism which none can deny, and to the inert it appears so delightfully vague as to involve no possible risk to comfort and peace of mind. Without question then we all agree to it; but if we do, what follows then? Does it carry no mandate that should control our actions? Such a moral principle once accepted must impose

case of doubt about the physical condition of the candidate, any marked deviation from the usual standard of height or weight will add materially to the consideration for rejection. Five feet will be the minimum height for the candidate.

conditions that we are powerless to evade. A little reflection will show that far from being a transcendental speculation of no real effect, it is, or should be, a living fence influencing every official thought and deed. It commands us to be diligent in making ourselves useful servants through painstaking of all that relates to the theory and practice of our profession, and it lays down certain lines along which the discharge of our several duties must proceed, if we would be true to ourselves. "To every individual in the naval profession, no matter what be his position and his representation, there is granted a horizon of labor and effort plainly marked and unmistakable in the sunlight of a patriotism which takes the guise of a sense of duty. In the words of our great and good Farragut: "I will do my duty to the best of my ability, and let the rest take care of itself." For a rule of action, then, the all-sufficient criterion when doubt arises as to what to do under certain conditions, is the good of the service. Whatever militates against that, is wrong; whatever makes for it, is right. "The best interests of the whole service are a text that ought to hang on every eye-lid in the navy." If we are guided by such a code we cannot go astray. To the good of the service we are bound by the obligations of a patriotism which it should be our pride to acknowledge as a rule of life, no less imperative now than was the personal loyalty to the sovereign which animated the great sailors of old. If it can be shown that an injury is being done the service, is it not "esprit de corps" that should immediately rouse us to combat it? "The best interests of the service are a text that should be on every eye-lid in the service."

So if I can, in my feeble attempt, show that an injury is being done, then I feel that you will aid in correcting the evil. This I will now attempt to prove.

When the candidate appears for his physical examination, he is closely scrutinized, measured, and his whole body examined to detect any defect or injury, any manifest trouble, and in addition a general summing up of the individual opinions of the members of the board, as to the fitness of the candidate is reached. If the candidate is passed, nothing more is heard, as a rule, regarding him; but this is not always the case, defects often show themselves and are discovered either by the academic officers, or medical relief is sought by the candidate for a trouble that has escaped the medical board. Often these are of a

serious nature and give trouble enough; and cases now exist in the service which are still in doubt as to how they can be handled in a fair and legal way.

To be clear, I will cite a few: A candidate, a few days after his physical examination, shows a venereal disease—contracted from exposure prior to the candidate's appearing for his physical examination and which was not manifest; as the period for its development had not arrived. He is sworn in and fully admitted; the candidate, though aware of the exposure, was unconscious of any disease at the time. It seems that this is a case of mixed responsibility. I will not discuss the ethics in the case; I simply give it as one of a number of a similar class.

Another case appears in which a slight impediment in speech is noticed; a further and closer examination reveals no trouble with the organs of vocalization or articulation. He reads, repeats, and answers questions properly; but it is afterwards discovered that unusual demands, or a sudden slight incident, produce such mental excitement as to render him unable to answer questions except with the most painful pauses and facial distortions. It is then shown that the trouble is central, and probably incurable. This is a case of medical error—or at the strongest, delinquency. This manifest defect should not have been passed.

A candidate appears, passes physically and mentally, and is held back a few days for his money-deposit; the day it arrives, he is sworn in although acknowledging at the time, that he is feeling badly; he immediately seeks medical assistance, and is seriously ill. This, to me, seems to be a case of error of the Academic authorities—a humane, praiseworthy error, but an error just the same.

I mention these three classes, as they occupy debatable grounds. The last class I shall speak of is of a different type and is the dangerous element. The candidate is rejected: It may be on one of the numerous defects put down in the list I have quoted, except the equivocal sentence regarding height.* The cause is

*This is so ably supported, it seems to me, as to leave no doubt in my mind; still I will not attempt to press my individual ideas, as I know that many others consider it as standing alone and apply it without considering the preceding statutes. Later I shall touch on this as bearing on the general subject of physical condition.

manifest, and the decision is reached after conscientious comparison of the views of the three medical officers constituting the board. Now, from the regulations and statutes I have mentioned, it would seem that the question of the candidate's efficiency or future usefulness would be settled. In some cases it does, but alas! in many cases it does not. Political, or personal, influence is sought and brought to bear; then the trouble begins. I have no doubt, the annoyance and trouble, with the number of people involved caused by the personal interest in a rejected candidate would surprise you, were they made known. I am firmly of the opinion that thoughtless letters and unmerited assistance are often given simply through the desire of the besieged to get rid of his persistent petitioner. The result is in the majority of cases, that the defect is waived, and the candidate is put into the Academy. I will not charge any one with willful violation of the law, knowingly inflicting an injury on his country, intentionally but unlawfully appropriating the money of the people—wasting the legally appropriated money for a specific purpose, jeopardizing the lives of a great many people; or endangering the honor of our flag and country in some future international trouble, by foisting upon the service an unsuitable applicant who may be placed in charge of a part of the fighting force of the navy, at a critical time when victory or defeat would mean everything. These are not immediate fears, you may say; no, I admit they are not; but are we providing only for to-day? are we not to look to the future? are we not to provide for contingencies? What has a puny, illy-developed, sickly or diseased boy to do with the welfare of our country? How can he cause, or in any way be instrumental in bringing about, any of the doleful troubles you have mentioned? I will endeavor to show you how. It could be answered by simply saying, "we are making admirals." If conceded as true that robustness is inseparable from intellectual strength, is it not what we shall seek? We are not in search of intellectual pigmies or physical giants, and must avoid as I stated in the beginning, the extremes, in our demands. We must seek the golden mean. And is it asking too much for us to expect this? Is it too high a standard? Are our people unwilling to support us in this? And have they not a right to complain if the standard is not kept high? What would be said if they thought we were not using every endeavor to keep it up to

the highest point that money and intelligence could possibly raise it? The means are put into our hands, and it is our duty to be true to the obligations placed upon us; and it matters not how small the effect for good or evil, we must help the former and repel the latter.

Is it not astonishing how legislators who frame our laws will urge action that is a direct violation of them? Is it not surprising that those who are supposed to see them carried out will thoughtlessly fail to enforce them? Is it not presumption to ask a person to distort or misinterpret his own convictions for personal and selfish ends? And are we not derelict in our duty if we fail to point out misapprehensions to the conscientious, to firmly repel the arrogant, and to strongly rebuke those who cannot differentiate corruption and integrity? All these things are constantly being done; no doubt, in some instances, unintentionally and thoughtlessly. Perhaps a kindly feeling and sympathetic nature will incline one to listen to such appeal, and during this momentary impression a waiver is granted; whereas, a few kind words of explanation pointing out the dangers that such recommendations involve would appeal to the reason of the petitioner and cause a withdrawal of the request. If not, then no consideration should be shown him; and he should be sternly but kindly, rebuked.

What are the actual conditions which we meet in candidates who fail physically? One may be below the height or poorly developed; his eyes are defective; hearing below normal; or his teeth deficient, irregular, and bad. Another's tonsils are enlarged or his nose imperfect; making him a marked mouth-breather. Defective speech, and illy-developed chest, or his lung capacity being below normal, rejects; while others, who are knock-kneed, or have weak abdominal muscles, patulous inguinal rings, defective feet, hammer-toes or stiffened tendons, or serious heart trouble; are found physically unfit for the service. These are manifest defects, glaring and dangerous, but they are waived, because they are considered of little moment by those in higher authority. The statutory barriers to protect and conserve a high physical standard for the personnel of the navy are broken down, and the service is inflicted with a defective youth, so far as physical condition is concerned.

In the yearly examinations of those already in, we find de-

fects, or signs of degeneration, that were not manifest, or discovered, at the time of entrance; these cases are rejected by the medical board. Influence, again, is brought to bear, and the findings of the board are cast aside; which causes a further increase of defectives. This continues yearly, slight additions are made to the list of the physically imperfect; and the service is weakened correspondingly.

It is curious to note the rigidity with which one clause is adhered to, and which is not more mandatory than the law governing the other cases; the waiving of which would, in my opinion, involve no danger, but would be of decided advantage—I mean the *age limit*. This, to my knowledge, has never been waived. None of the defects I have mentioned are hypothetical; they all are actualities. Let us take up the cases cited and carefully point out the consequences that may result from allowing them to enter.

As I look at the matter, the Academy is not to be considered a school for the development of the weak. Its object is to conserve the health and see that normal growth and development are maintained in both body and mind. We are not to limit our view to the boundary of the school, we must consider the service demands that will confront the candidate after he leaves his alma mater. We are taking him as an immature youth, and must not alone measure the physical abilities of his body to sustain the work that is expected of him during the four years course at the Academy; we must allow for the development in his actual growth to secure a healthy manhood. Equilibrium will not suffice; the renewal of tissue must be greater than the replacement, or development ceases, and the youth remains stationary; it is a retarded or checked growth and means that early decay must follow or, at best, a degraded physical state maintained. It is here we are so often misled through the confounding of the mere preservation of the individual and the, at that time, status, concurrent waste and repair with the essential nature of vitality. We cannot definitely say when development ends and decline begins, but we can see approximately when it is taking place; and we know that in the weak or slowly developed that the decline, when once started is rapidly followed by degeneration.

Physical conditions and relations are of the utmost importance, as age, weight, height, chest-measure; all deserve the most careful

comparison. Age is the standard from which we must measure the other factors. It will not do to be misled by promises or possibilities. We must not depend upon the dormant vitality, which is required for special use and to give elasticity to our constitution; this wise provision is to conserve our forces and should never be called into play in the growing youth. Inherent power and individual endowment must be considered. The resisting powers can only be judged by the physical; it is logical to assume that the strong have more endurance than the feeble. These are certain facts that can guide us and which have been proven by the statistics furnished at this Academy and so carefully worked by Dr. Beyer of our service. Development and growth from year to year are anything but uniform and regular.

To save time I will not give any table but will state results which bear upon our argument. Growth in height practically ends at 18 years; after that if increase takes place it is very slow. The greatest development in height is between the ages of 15 and 16, and then continues up to 18. Short boys grow more rapidly than tall ones, but their growth ceases about the same time—at 18 years; the increase in four years is for tall boys, 2 inches; medium boys, 3.3; short boys 4.2 inches. The chest reaches its maximum size practically at 19. The lung capacity at about the same time.

Another singular feature about development of the candidate is the eyes: they show a positive increase up to between 19 and 20 years. In the normally constructed healthy eye this shows that the course of study is not injurious; but deterioration begins after entering the naval service. This is a most important fact to bear in mind, and is of the greatest value in estimating the physical future of the candidate.

The acuteness of the hearing grows perceptibly less; which fact should constantly be kept in mind. The condition of the teeth, unfortunately, has not been carefully studied until within the past few years; still I hope to point out their important bearing upon the subject of physical fitness. We know that good teeth indicate good health, and marked deterioration of the teeth must mean degeneration. I hope I have mentioned enough about ontogenesis of the cadet, to enable you to appreciate the necessity of carefully weighing the various defects and the dangers that lurk behind them.

I am fully aware of the delicacy of the direct discussion I am about to enter upon; but I repudiate any personal reflections. No one can properly and forcibly put the subject before you unless he be allowed untrammeled permission to draw from authentic sources facts, to support his premises.

I earnestly invite your attention to a rapid consideration of the far-reaching injury that is likely to follow the passing of physical defects in a candidate, not only during his academic course but after he enters the service. I will be as brief and untechnical as compatible with the non-professional mind, in making clear the future dangers of these, apparently, trivial defects upon the individual, the service, and the country at large.

The present requirement for height with age is too low; for, if the records of the Academy are of any value, they prove that we cannot expect but the fractional part of an inch increase in height after the age of 18 years. To insure a mean height in our naval officer, it would be well to have a law passed fixing a standard in height of 5 feet 6 inches, which must be reached at the time of graduating; and such a law would insure a higher type of officer. At present too much risk is assumed on possibilities. Some extreme case is quoted of phenomenal growth having occurred in one or two years, and this exceptional case is the excuse which has opened the door, and the short, illy-developed youth is taken in with a vague hope that the regular life and systematic training will, in violation of all physiological laws, produce the wished-for results.

It is sophistry to argue in favor of a small man for military purposes, particularly an officer; he cannot have a military personality, no matter what his intellectual attainments. This is admitted the world over, and is carefully considered by military nations in the selections of their officers. Enlisted men generally judge an officer by his outward appearance. It can be set down as a principle that a small man is rarely a successful officer. There are noble exceptions to this, but they are not to be taken as types.

The natives of our country are large men. An examination of 315,620 native-born Americans gives a mean height of 67.672 inches, with a mean chest measure of 33.418 inches. Are we asking too much to fix the standard of minimum height for the grad-

uate at 5 feet 6 inches, when the mean for our people is 5 feet 7 3-4 inches?*

The chest is of great importance not only in size but mobility. I cannot enter into a full exposé of all its bearings upon the body, but will say that great mobility of chest is a good measure of vital power; and that every one at graduation should have a mobility of at least three inches—and the chest measure should be, at least, 35 inches. A slightly mobile chest is a strong indication of non-resisting power, tending to lung disease.

The question of weight is, also, important: the paper will not admit of a full discussion of the subject as it varies in different ages, but I would make the weight be, per inch of height, at least 2 lbs. at the time of graduation. Obesity cannot be fully discussed, but I will simply state that marked tendency to flesh in the young, matured, man is an indication of a diseased condition; not more than 2 1-2 lbs., per inch, in height should be permitted in any graduate.

Vision is a subject that is treated in the lightest manner; this carelessness I can only account for from the prevalence of glasses that all meet with in civil life, which evidently impresses those who grant the waiving of these defects in the same manner it does the civilian and, I may add, many of our specialists lend their aid by submitting letters in behalf of the candidate that are likely to mislead through their diplomatic wording and make one think the matter is not serious. A brief examination of this matter shows: Most of the troubles are errors of refraction; the majority of them can be corrected by glasses; none of them can be cured. If spectacles are to be a part of the armament of the embryo naval officer, we should drop the visual requirement from the physical examination. In many of the cases of rejection we find the defect is progressive; still they are continued in the service. After a few weeks' use of the eyes in the course of book study, complaint is made and the eyes are found unable to stand the strain; glasses are used surreptitiously, or through recommendation; which is wrong and should be stopped. Think of the

*The fixing of a standard for entrance I have intentionally refrained from considering as it will not permit of the merited discussion it deserves in the limits of this paper. It is one that should be considered by a board and is too important to entrust to the opinions of a single individual. I will state that there is absolutely no complete definite regulation regarding physical standard on either entrance or graduation.

dangers: No man who wears glasses, can be relied upon in rainy weather; he is untrustworthy in a snow-storm, fog, or very cold weather, from the blurring of his glasses. A myopic (near sighted) man can not see land, a ship, or buoy; detect defects in ship or gun-gear, or dirty or slovenly men; see signals, sight his gun; read charts, or take bearings in a quick and positive way. The mistaking a 3 for a 5 or 8 in reading a fine print chart may wreck a ship; failing to see a vessel when she is visible to the normal eye may sink himself and another ship and cause a terrible loss of life. In battle, he cannot properly aim his gun because of inability to adjust the gun-sights or wind-gauge, through the deposit on his glasses of the gases from the explosion. Long vigils on dark nights, thick weather, sun-glare, and many other conditions that must be met with, daily, hourly, weekly—in fact, constantly on every ship in the service, make him unreliable. At a critical time these defective eyes may give out, the possessor seeks medical aid, and the ship is deprived of one officer. Such a man is a constant menace to the welfare of the service.*

Defective hearing is still another trouble that is constantly waived. Unfortunately, few cases of defective hearing can be cured; at best, we can arrest their progress by constant attention. They are progressive, as a rule, and grow worse in face of the facts; but little heed is paid to this important sense. The chances are, in the service, that the normal ear will receive injury. What right, then, have we to expect a diseased ear to improve? The necessities of normal hearing, are so apparent to me, from my experience and observation in the service, that, to say the least, I am astonished when I even hear an intimation of an attempt being made to have the defect waived. The necessity of promptness in obeying orders depends upon the hearing; if this is defective, see what calamities may occur. At the present day when orders, or messages, are transmitted by mouth, telephone, bell, bugle, gun—all varying in volume or intensity, given amid noise and commotion, of action or manœuvre, how necessary it is to have normal hearing. The failure to hear a fog signal; a bell or whistling buoy; not to get an order correctly, or fail to catch

*I would allow glasses for the simple hypermetropic (far sighted) with slight regular astigmatism for study only, as the strain would be relieved and as this is not a defect, but shows great accommodative power.

a sound, through defective hearing, may cause the loss of a ship, lead to defeat, and innumerable disasters. Are we justified in knowingly assuming such risks? Can we offer any excuse for inviting such danger? And is it "Esprit de Corps" to allow these menaces and injuries to continue? Nothing, I say, can sustain us in allowing such defects to continue, and I submit it to the well-wishers of the service for an opinion.

The mouth with its appendages, particularly the teeth, is almost overlooked. The triumphs of dentistry are used as an excuse to foist upon the service some of the most unworthy candidates from a physical standpoint. As in the case of the specialist on the eye and ear, many dentists who devote their time to oral surgery, justly proud of their work, see possibilities and, in a broad sense, do wonders; but forget that a special class like the military branches, liable to be distant from their post for long periods, should not be included with the civilian class. They like other specialists, "though working in the interest of the individual may, in the long run, serve an evil purpose in society." This we find to be the case in the naval service. A carious condition of the teeth is a just cause of rejection; if extensive in the young, it is a sign of degeneracy; one should properly masticate the food, and if this is not done a depressed state of the system must follow; the digestion is interfered with, impaired general health, inability to triturate the food from the lack of teeth causes the remaining sound teeth to soon decay. It is useless to accept such a case. I will cite one of the many cases: the record of one midshipman in the Academy who had 36 days on the sick list, 31 of which were directly traced to defective teeth. Aside from the æsthetic effect, the part the teeth play in clear articulation so essential to an officer is another factor. An examination of the carefully charted records of the midshipmen now in this institution would convince the most obtuse of the gravity of this defect. It is unfair to expect that the whole field of dental work should be undertaken here; the future is what we are to consider; we must look beyond the limits of this school. I speak from professional observation. The neuralgias and toothaches, the hopeless attempts to relieve suffering without sacrificing a tooth, at sea, have confronted me so many times that I have conscientiously combated the admission of any one with marked caries into the service, and have endeavored to my utmost to induce men to

attend to their teeth. No man suffering with toothache can attend to his duties properly. The sick days due to troubles of the teeth would startle one if mentioned. It can be accepted as true that, "soundness of teeth is in itself one of the evidences of general soundness of body."

Difficulty of speech is another trouble; some are amenable to treatment and are cured; but when a central chronic case occurs in a subject of marked neurotic temperament, in which the least excitement will render him speechless for many seconds when the loss of a few seconds in giving an order may cause disaster—such cases should admit of no hesitation in refusing admittance. Still, these defects are waived.

Heart trouble should be mentioned—without comment, its hopelessness should suffice. As this grave defect is repeatedly waived, I feel that I must make a few comments to have it checked; and will dismiss it with as few words as possible. Heart disease cannot be cured, though it can be held in check with constant systematic care. Knowing the active exercise and exertion constantly demanded in the varied drills, running aloft in sail drill, light artillery, boat pulling, infantry tactics, fencing and gymnastics, it is astounding that political and personal friends, even medical men, and the parents will combine to have this incurable disease set aside, and allow the candidate to enter. I have wondered and pondered over this and tried to excuse these terrible blunders on the score of gross ignorance of the actual state of affairs. I cannot conceive of any parent or true friend who would, willingly, shorten anyone's life, or intentionally inflict suffering upon him. Yet, this is done constantly. To say the least, it is a serious reflection upon the opinions of the medical board to have their findings set aside on some civil practitioner's carefully worded letter, in which he skillfully avoids a positive opinion that the heart is sound, but shields himself behind such indefinite expressions as "a very slight murmur is noticed," "probably functional," or "the irregular action is one common with neurasthenic patients," or "the compensation is good"—I am willing to admit that they know nothing of the demands that are to be made upon that heart, and that their opinions are based on the experiences with people in civil occupations who can choose their vocations. These guarded, professional letters lead on friends, relatives, and parents to allow the candidate to enter the service; and they are

dropped before their academic course is finished, physical wrecks through misguided advice. I plead with you all to stop this terrible injustice, not only for the good of the service, but for the cause of humanity. I shall never, knowingly, sign a paper, without protest, that will admit a youth with heart trouble to the naval service.

There are other defects that are of equal importance, but their numbers are few and can, occasionally, be remedied by a surgical operation; but until this is done, the candidate should not be accepted; (but) as it is a question of individual opinions, and the degree of the defect varies, some are passed on the supposition that it has reached the maximum and will remain stationary. I refer now to varicocele and varicose veins, and hammer-toes. Varicocele, if slight at the age of 18 years, is not liable to increase; but even then, the candidate, if accepted without operation, should be taken on probation—for it is generally a sign of weakness. Hammer-toes are caused—as a rule —by ill-fitting shoes, and youthful vanities; if no over-riding, ingrowing nails, or corns, exist with them and the gait is not affected, the candidate can be accepted on probation in these conditions; if the tendons of flexion or extension are not good, rejection should follow. For we must not forget the marching, walking on deck, and long standing on the feet that will be required of the candidate not only during his scholastic training, but after he enters into active service.

Under the head of poor development we must include the numerous single defects, each one of value when considered with the others, the sum of which is sufficient to make the candidate unfit for the service.

An example will best illustrate: Face contracted, but regular; nose with but little mobility; irregular but sound teeth, but a number unerupted; a mouth-breather; chest slightly irregular, breathing shallow, circulation fair; no abnormal sounds; flabby muscles; genital organs markedly developed; stoop-shouldered, with a very slight curvature; feeble in muscular strength as shown by a squeeze, pull, and lift. His intelligence is very good, no manifest trouble can be found, but his whole physical make-up is unsatisfactory; no one thing would be sufficient to reject. The question is, what is to be done? You may say, he is in the balance and just levels it. I advise, reject. We must give the

service the benefit of the doubt. It is here we again meet with difficulty.

Poor physical development opens such a wide field of possibilities for the good or the bad; and it is always possibilities for the good that the friends of the candidate argue to overcome the rejection.

Far be it from me to degrade the science of modern medicine in any of its branches, or discourage any attempt to strengthen or improve the physical condition of my fellow-man. It is the medical man's duty to use every faculty of his mind to encourage the weak, to relieve suffering, and conserve health; to strengthen and develop to the best of his ability any, and every, part of the body that falls short of a normal standard. This we do, but in a special department like the navy, and for a specific purpose, fighting, we must use every endeavor to secure a certain type of youth—one possessing an equal admixture of Brain and Brawn—and starting with material we do our best to preserve and develop these two elements to secure a fighting man for the naval service.

As I take it, the Academy is not an institution for the development of the weak and puny. If I am right in my surmise, then it resolves itself into whether the government is to assume the doubt? The regular and systematic life at the Academy is very different from what is met with in the service. Our officers are expected to work under all conditions of peace or war; irregularities and privations are liable to confront them at any moment, from the arctics to the tropics, on deck, in engine room, or ashore; from dry to rainy climates, in healthful and unhealthful places, with broken rest, long tours of duty, with unsatisfactory food taken at odd times. These conditions are likely to happen at any time and are a severe strain on the constitution; a strong body is required; endurance, pluck, strength in every way. Courage and determination are inherent traits; they cannot be acquired, but may be assisted; it is difficult to gauge, or judge of, them; so this is a factor we cannot pass upon in a midshipman, but it can and should be noted in his behavior while at the school. In fact these characteristics are of the greatest value and are not taken into consideration at the school or in the advancement of officers when they get into the general service.

If what has been said is true—can we justify ourselves in

entrusting such varied and vast interests in the hands of physically imperfect men, if they are defective in any of the organs or bodily appendages I have named? Can weaklings lead the strong through personal example? It is forced upon us that they cannot.

An officer once applied for the command of an expedition that was considered one that would call for great endurance, and possible hardship; he was found physically unfit. In urging his case he said, "Mr. Secretary, I am not going to play the *mule* on this expedition; I will direct others how to do that."

"Very true, sir," was the answer, "but should you be called upon to play, how would you fill the billet?"

"Poorly."

"Very well, sir, you will not do."

In my career in the service I have seen so many cases, as no doubt the majority of the officers have, of fine specimens of the fair-weather, easy-work seeking officers; how they puff up and tire their diaphragms with bombast, when work is light and watches normal; who shrivel up to their normal puniness when work is hard and watches are few. This lack of moral force we find curiously spread round and equally shared by all corps in the various types of sizes in the service.

A psychic condition difficult to analyze. It would not be seemly to discuss the question beyond the six-year midshipmen. The officers' personnel has been ably, clearly, and freely discussed by numerous essayists from their professional standpoint; so I leave the medico-military study of the officers and will make a rapid examination of the enlisted force.

The efficiency of the enlisted force of the navy begins at the recruiting office. At this point, a few remarks may well be made on the manner in which this duty is looked upon; it does not receive the careful consideration that the importance of the subject deserves. In so many cases, both officers (one line, and one medical) composing the recruiting party are not suited for the work and do not realize the importance of the duty; quantity instead of quality seems to be the incentive; and this is tolerated, I fear, by those in higher authority who want the men, and become impatient if the returns are not large for the outlay of money. From long experience in examining men and their professional care on board ship after, I am convinced that the

examination of men requires an experienced medical officer—one who has had duty at sea long enough to know fully the demands that will be made on the man in the service. He must be familiar with the various departments of the ship and know that the firemen and coal-heavers require certain physical features that some other department on the ship would not demand—such as large, mobile chest, regular, slow, strong heart, healthy skin, sound digestion, and good weight. I mention these points, not to dwell upon the question but to illustrate; and will relate my experience with many recruits, that have been accepted within a year by medical officers, who had healthy, though slight chests, rapid hearts, harsh skin, poor teeth and digestion, and were slight in build. Evidently, little thought was used here; or, the medical officer was ignorant of the kind of man required, or the character of the work. Recently, I saw a flattering notice of a recruiting party who enlisted a great number of men in a week; from my experience in examining men I know that, instead of commendation, a few words of reproval were merited by that party; for no officer could properly examine that number of men in the allotted time. Fifteen minutes should be spent on every man after he is stripped; this is the least time that should be allotted to properly record the required data. If less time were spent, then I would say he neglected his duty. If he worked extra hours, he must have been unfitted for two successive days' work of the same kind. I have been on boards of survey on scores of men fresh from the recruiting officer, with the most serious defects—showing the grossest carelessness; no doubt, due to this hurried and reckless habit of examining.

A few examples will demonstrate: men with heart trouble that the mere placing of the hand over the heart would have revealed; almost total blindness in one eye; deafness very marked; a full set of false teeth; partial stiffening of the elbow joint; hernia well-defined; marked stupidity, or rather feeble-mindedness. It is too serious a matter, not only in a monetary loss to the government but the loss of time, through the poor material that is put on our ships. Better a dozen healthy men than fifty ill ones.

Let me very briefly trace what follows these neglects. First a request for survey; report of survey in triplicate; forwarding of these to Navy Department for approval and final disposition; return of papers to the ship. Besides the work entailed, delays of

days and weeks may occur; during which time the worthless recruit is entitled to his food and pay; and all due to the misdirected zeal and the saving of a few minutes by the recruiting party. It seems to me the subject is of sufficient importance to cause a reformation of the present method, by selecting men of experience with a well-digested knowledge of the requirements. and a keen sense of the responsibility that is resting upon them in passing a final opinion upon the fitness of recruits. They should keep ever before them the indisputable facts that: "Good health is the basis of all physical, intellectual, moral, and spiritual development;" "Poor ships with healthy crews are preferable to fine ships with sickly ones;" and with these should go the noble standard set by Admiral Cook: "The livery of the United States should be made a badge of character and worth, and the privilege of wearing it considered a great honor." Unless we accept this dictum and nurse and inspire the principle involved, we cannot have that "Esprit de Corps" that is essential to the successful advancement of our navy. These sentiments should dominate in the service; they are free to all; they are the legacies of the healthy mind that our Creator has left equally to all; they belong as indisputably to the youngest apprentice as to the admiral. We should recognize and spread these truths, and impress them upon the whole personnel of the service, and this can only be done through having a high moral character in both officers and men.

The ability to judge of the morals of a man by inspection is a difficult matter; but the brain impression and mind force are reflected on other parts of our body so that some knowledge can be obtained by a study of the appearance and movements of the man, the facial expression, and his replies to questions. If tattooing is on the body it is worthy of consideration; when of a crude and sensual character, or if a nondescript design placed haphazard on the body (especially on the genital organs), it is a very safe opinion that the man is a degenerate. Numerous scars on scalp and face, with maimed ears and long cicatrices from knife-cuts and stabs, indicate depravity—a quarrelsome or dangerous character. Careful observation and long experience alone can impart this knowledge; still, it is well for every naval officer medical and others, to observe these peculiarities in the study of the men composing the crew. It is not surprising that many degenerates succeed in passing the medical examiner and get

into the service; still I can find no reason for their retention after they are discovered. We all know the evil influence that a few bad men can have upon a good crew; their subtle methods of strengthening their depravity by entrapping the weak, but immatured, innocent ones are a constant danger. As the moral condition of the personnel is of importance in estimating their value to the navy, it should be considered fully and carefully before accepting any one in the service. It bears equally upon the requirements of an admiral as of the men. In fact, it has such a strong bearing upon physical soundness that it should receive a larger consideration than I intend to give—not from lack of desire or interest, but the limited length of the essay will not admit of a full discussion of the subject. I shall mention only the enlisted force in a brief way to indicate the requirements and the lines we should work on, and which, I am happy to say, is gradually tending toward a higher plane. Capt. Mahan says, "It is the moral tone that most especially calls for education and elevation." "This failure of moral tone is seen most markedly in two things. As a rule they attach no idea of moral wrong to the violation of a contract, hence desertion. Equally, they have no sense of their dignity as men, nor the beauty of self-control, hence drunkenness unaccompanied by any sense of shame." In part, this is true: I believe, however, that many desertions are due to the presence of bad men in the ship, which often forces good men to desert rather than be compelled to associate with degraded ones. Whether correct or not, is it not our fault? If we added to the dignity of the crew by eliminating from the ship all vicious men, by encouraging in every way their self-reliance, by entrusting them with certain power to enforce morality, and trusting in their honor and encouraging them in their work—if we make them feel that their humble position is one of honor and responsibility, and that their shipmates are largely in their keeping and their making, will it not tend to elevate the morals?

I do not include among the vicious all intemperate men, for all such men are not vicious. I would not include in this statement the men of long service who, like the enlisted men of twenty-five years ago, formed habits from former associates; they were of the old school when narrowed lives within the walls of the ship and restricted liberty of a few days every three months led

them to the belief that to get drunk and whoop it up was an inherited and expected action from the old salt. There are not many of this type; they were a noble set of men, neither saints nor sinners, but stalwart, simple, honest sailors: generous, obedient, and courageous, who always exhibited their worse side to those on shore who knew them not—but whose worth was known and appreciated by their officers. No, I do not include dear old misunderstood blue-jackets of long ago; the few remaining shipmates who make us older ones happy to shake their hands, a pressure that produces a mutual feeling of pleasure; an unexplainable but perfectly understood mental awakening that transfers us to scenes of the past. I know they had faults, though I cannot recall them. It was the other fellow who was the tough. I wrote my memoranda by candle light and I omitted names, but I did record the good points of his character, and his deeds. No, he is not the one. He is a survival of the fittest—and that is proof of his robustness and moral worth. I know his struggles, how he has buffeted the moral and professional storms of a sailor's life, which the present generation knows little of, and which could only be understood by a psychologist. What a blessing that we remember our pleasures and forget our pains. I have read the crude sign-board of the past erected by our sailors of long ago. I read this old shipmate's guide-post with its simple legend by the modern electric light. He stands, naked, before me for his last active service examination; and I note the eagle and our flag upon one arm, and on the other—Faith, Hope, and Charity. I see the faded tattooed cross upon his wrinkled weather-beaten breast, which throws his shortcomings in the shadow; the pressure of his hard but generous hand; and the fearless, honest look of his eyes is kindness and all else. His meek lips seem to form those few divine words: "Lead us not into temptation but deliver us from evil." It is the soft æolian music handed down through the ages, as clear and harmonious now as when first heard by Christian mariners. Every sailor has seen the tracing of his tapering mast against the sky among the stars; it is a mystic writing, still I like to think they are of the same exalted nature as the words of the Maker when he wrote in the dust at the feet of the accused woman. No man knows what they were, but they seem to me to be an admonition of a Christian's duty towards his fellow-man; an incentive to a kindlier thought, a nobler deed, a

purer life. Let us endeavor to inculcate and promote these ideas among those with whom we are thrown in the navy.

In my retrospective study of the improvements that have gradually taken place in the personnel of the navy during my connection with it, I find that the lines followed that have led to the best results have been the sanitary, moral, and intellectual. I cannot dwell at length on any one, but will endeavor to point out by example the evolutions that have taken place.

We older officers can recall the ship's head in the bow of the vessel with its discomforts in every way. The seas or spray that often made it unbearable in storm, or rainy weather; how many realized aside from its mal-odors and discomforts, the absolute distress and diseases it produced on the intestinal organs of the men; or the discontent and ill-temper that these diseases in a mild form produced. An improvement in that one respect brought untold comfort and saved days of illness, and added to the contentment of the crew.

We remember the old, greasy, black mess-cloth, the scouse pans, the sailors grouped about on the decks eating their food—which was good of its kind, but a very poor kind; the weevilly bread, or rice, the rusty pork, the tough old salt horse. An improvement in the ration, in variety and quality and preservation, checked digestive troubles and added cheerfulness, for any victim of indigestion cannot be cheerful, obedient, or do good work. It was such a common complaint that very little medical attention was paid to it, for the ordinary case requiring a simple improvement in the food was beyond the abilities of the commissariat. What a step was the introduction of the table! what a civilizing effect it had to see men seated about it eating their meals, writing their letters or reading!

We remember the lack of reading matter; no libraries for the men, and only a few dry, out-of-date professional books for the officers. A canvass of the ship revealed that only a small percentage of the crew could read or write. There was an old saying that "a hard worked ship was a happy one," and to this false saying I was a convert for some time, until I noticed certain men, when idle, stare by the hour into space. I had often wondered what their thoughts were, contemplating a ring-bolt for long periods, until inquiry revealed that they could not read. What a God-send was the crew's library! What an attraction to those of the

better class, able to read! What a boon to the service was this educational inducement for a higher intellectual plane! It has done, and is still doing, a great moral work.

Liberty was rare; and it was generally understood that a return on board before his liberty time had expired meant that the man relinquished all consideration so far as that liberty was concerned. What a humane act it was to increase the frequency of liberties and allow the men to return to the ship as often as they chose without curtailing the time granted them! In some ships I have been on, the men were encouraged to seek the shelter of the ship at night and take their meals on board, without curtailing their liberty. Thus saving their money, and protecting them from temptations.

What inducement was there for a man to save his earnings? None. If he had money on the paymaster's books it could all be swept away by the sentence of a court martial. To-day the generosity of the government in allowing interest induces him to save. What a humane forethought to rescind this power of the court and thus provide a nest-egg which, with his service pension, will add many comforts to his retired life.

We were not so particular then in shipping men; foreigners without regard for any ship, flag, or country, were taken; all nationalities were accepted. The high pay was the only inducement to them. What an improvement in the crew since an intellectual standard has been required; and they must be American citizens; and how improved has been the growth and display of patriotism on the part of the men. Personal hygiene was sadly neglected: I cannot recall, in my early experience, a single tooth-brush forward of the mainmast. What a pleasure to-day to see the major part of the crew using brush and powder to preserve their teeth, so essential to health.

Mails were infrequent, and when they did come, most of the letters were for the officers—and few for the men; now, the mail consists of many bags, the largest part for the crew. On the Massachusetts I counted the number of letters received and sent out by the crew in one month, and found that 3144 letters were received, and 3464 sent off. Is this not sufficient comment on the intelligence of that ship's company?

We, all, can recall within the past few years the old "messing" system prevailing on our ships, with the constant trouble in com-

muting rations; the running away of the mess-man; the many worries of the first lieutenant over unpaid bills, etc., etc. What an advance has been made by the establishment of the general mess? There were complaints at first, but I carefully investigated the matter and found that the leaders in the opposition were the mess-men, who saw their powers of peculation gone. The unmerited romance of the bumboat has been, I hope, forever dropped from the navy; the canteen has supplanted it and given more comfort and contentment than was at first anticipated. These crudely-drawn and brief outlines show that the apparently diverse features, when carefully studied, have produced unexpected, beneficial results.

Many years ago (1876), Chaplain Wesley O. Holway found it difficult to draw the men to his services or get their close confidence, and his appeals for assistance or advice from his messmates met with no encouragement; he did not give up, but took a new path to accomplish his good work. He found that Jack's degradation was not due to a natural inclination but rather to his environment; so, through an off-hand talk on a piece of chalk, aided by a blackboard and a low power microscope, he succeeded in drawing (as he said) many repentant souls to Christ. This germ of twenty-seven years ago is bringing forth fruit to-day; through the electric lantern that is furnished by the Bureau of Equipment.

Regarding the apprentice system I shall say but a few words; the physical examinations and requirements apply the same to them. Three years' experience in one of our training ships convince me that we take the apprentices at too young an age; sixteen years should be the minimum, or better seventeen years; they are too immature and too frivolous, and are of little use as a physical force; they are sent to our regular cruisers at too early an age, and are a constant source of trouble; they fill a man's billet and do a child's work.

I can only speak of the landsmen from meagre experience, but my observation is that they are more earnest and readily *learn;* their mature age and greater bodily strength make them valuable; and, I further find, they are more intellectual from the advantage of longer schooling and acquire knowledge more readily, and are anxious to improve themselves in the duties of the ship.

I have long thought that the coal-passers are the most neg-

lected men in the crew; they are the most degraded in proportion to their numbers, through indifference, I fear, and long-standing reputation for being tough; many are excellent men, but their low intellectual and moral plane is largely due to our not being more careful in selecting them. Some system should be adopted to improve their condition—one I can suggest, that applies to the whole engineer's force, is the closer study of the ventilation; it is not so much the question of pure air in their case as it is cool air. We should not feel satisfied with a temperature of 110 degrees, but should strive to secure moving currents and a lower temperature; for no man can do efficient work in such a temperature for three or four hours. The arrangement of our coal-bunkers is bad; and it appears to me that there are great opportunities to improve the handling of the coal after it is stowed, both in time and labor, and under less trying circumstances. I can only see the hygienic side of it, but cannot point out the way to remedy this defect.

Of the move that is being made to afford amusements for the men I cannot speak too highly. All sports should be encouraged; and at every navy yard and station an ample and well-equipped athletic ground should be provided where baseball, football, and field sports can be indulged in. Another important feature should be a club-house at each station within the yard, with gymnasium, reading room, and a room for such games as dominoes, cards, checkers, and chess. A large hall, with stage and simple scenery, in which entertainments could be given by the men would add to their amusement, and need not interfere, in the least, with the noble and generous efforts of the Y. M. C. A. to establish naval branches of their association.

I have often thought of the utter lack of inducements for the sailor-men to enjoy a domestic life, with wife and children. Their life seems to oppose it; yet I know of many who have been made better men by marriage, and they have felt that the sacrifices they have made through almost constant sea-duty were repaid by joys received. To induce men to remain in the service and reach a high standard, and to encourage marriage, why is it not possible to give shore duty to a certain number of continuous service men of a special merit or conduct class? I suggest the following scheme, which seems feasible; we all know that large sums of money are expended whenever a vessel is put in com-

mission, directly chargeable to deterioration while the ship was laid up at the yard, or in ordinary. This great amount is a surprising one.

I was told that the cost of restoring one vessel to the same condition she was in when turned over to the yard authorities amounted to nearly $200,000; and this was less than two years after being tied up at the dock. Another vessel required $10,000 expenditure after four months lying in ordinary; and this expenditure was principally in the machinery department. I was informed that a detail of sixty-five men in one case, and twenty in the other, would have kept these ships in condition so that they could have been ready for sea as soon as crew, stores, and coal could have been placed on board; and the cost would have been, roughly, less than a third of this. Time, which is of value, would have been saved. The practice now is to simply place a watchman on board, whose duty consists in seeing that the ship is not depredated by sneak-thieves. At every navy yard in our country such cases occur. Are there not similar billets at the Naval Academy, at our magazines, on our receiving ships? In fact, every place controlled by the navy which our men could be assigned for shore duty for one, two, or three years? I know of one case of the admiral's barge, and various tugs, at one navy yard, of men having held these billets for years; they are special enlistments and are not sent to sea on that account; if they were required to go to sea, they would throw up their jobs. All such places could be given to our married men; and the knowledge that only a special class of men would be eligible would be sufficient inducement for the men to merit such a distinction.

In his report, the Chief of Bureau of Navigation speaks of the number of desertions, etc., etc., and gives certain reasons. I will give extracts from observations, on three ships, that were curiously made at intervals of about eight years; each case stands by itself and each shows the lines on which the progress was made, and benefits obtained; which are striking and manifest .... I served on a ship (she was painted black), in which the regulations were carried out to the letter, and rules not in the regulations were also carried out. I do not hesitate to say she was perfect in one way, "ataut" from truck to keel. She would have impressed any one not attached to her as a model; her yacht-

like appearance, so beautiful in every way, and so comfortably fitted for officers and crews; yet she was an unhappy ship. She was ruled with a rod of steel; the men received no consideration, the officers about the same. Now what was the trouble? It was all work and no play.

There were ample hours to afford rest and amusement for Jack, but none were ever indulged in; in fact, they were discouraged. There was no joyous laughter ever heard within her somber hull; there was no innocent skylarking about her decks; no music, either vocal or instrumental, ever broke the stillness of the evening air, either in port or at sea. Liberty was given as seldom as regulations allowed, and it was dearly paid for. The returning liberty-party was scrutinized with a tyrannical minuteness, and any shortcomings punished with a promptness and vigor that only the most daring and reckless would face; no pets were about the ship belonging to the men; a single cat softly trod about, and he appeared symbolic of her general condition. The daily inspections were superb, so far as bright, clean arms, tidy uniforms, perfect decorum, and silence were concerned. Look in the faces of the crew! They were clean, they were intelligent, and a fair type of sailor men, but there was not a single face that bore a soft expression. The compressed lips, the contracted brow, the depressed corners of mouth and eye, the expanded chest and rigid position of the body—the quick, momentary glances that caught your own, all indicated discontent, hatred, unwillingness depressed spirits, disappointed hopes, suppressed emotions, a fettered manhood. Extra liberty was occasionally given to a few in some quiet and out-of-the-way place to fish or walk ashore. But it was seldom requested; too many refusals had been given to encourage further attempts. I have often noticed her beautiful boats, so clean, so graceful, so perfect, hanging in idleness at the davits. They were seldom in the water except for drill. No racing among the crew, no sailing or fishing parties disturbed them. Very seldom visiting parties went from the ship to other ships of our navy, or from other ships to ours; no library existed for the men, a few books belonging to individuals circulated among the crew. No religious service was ever held on board. Were the officers happy? No; they were a discontented lot, or so it seemed to me, compared with the happy ship that I had left.

Why was this trouble, you will ask? It was simply a damnable application of a good set of regulations by the usurping of autocratic power by a narrow-minded man, who should have prevented instead of caused such a state; he was unintentionally assisted by the discontented minds of the other officers who, not receiving consideration from their senior, allowed their injured feelings and unhappy state to pass to the grades below, and so it ran through the ship. A little thought on the part of the captain, a little consideration for his officers, and by them for the men, a knowledge that the admiral and Jack have equal claims on the Almighty; that they are built the same, have the same organs, feelings, appetites; in fact the same mental attributes, varying only in degree and intensity. In other words, if intelligence had been used and properly applied, the ship could have been made a pleasant one.

I served on another ship (she was painted white) very similar in build to the black one. The same regulations controlled her commanding officer, about the same crew and with the same natural conditions, the same drills and requirements were exacted from the men. The same obedience, promptness, and tidiness marked the crew. The only difference that a visitor would have noticed in them would have been their faces, not in type or character, but the contrast between disappointment and despair in the faces of the first, and the contentment and confidence in the faces of the last. This great contrast would have raised the inquiry at once, what is the cause of this marked difference? Let me answer, it was this: The white hull of the last vessel was full of life and energy during recreative hours. The cheerful voices of the men were heard in song vibrating in the evening air either in solo or chorus; natural, hearty peals of laughter would ring out as some joke was perpetrated, or story told; the shuffle of feet was heard keeping time to the music of the volunteer band, as they whirled to the waltz, or other round dance, or tried a jig or break-down; even the ship's dog would give a joyous bark as he received the caresses of the men after performing some simple trick he had been taught, the pet minot bird would add to the pleasure by giving his song; feats of strength or skill in boxing were indulged in; races in boats, either under sails, or oars, were permitted on the asking; books were numerous and well thumbed; liberty was no novelty; visiting parties

to other ships were frequent; dinner parties were given on occasions of some holiday by the ship's company to the ships of our own or of other nations; desertions and intemperance were rare; punishments seldom; the brig was unlocked and empty most of the time. She was a happy ship! The men were not saints, they were not exactly sinners. They were simply a fine crew of sailor men. They drank in moderation; their other faults or vices were bearable; vile habits were suppressed; they were attempted once but detected and promptly put down by the crew, the offender was made so uncomfortable by the crew that he sought forgiveness, which was granted. No other case ever appeared.

The moral and intellectual tone of the ship was striking, and the three years I served on her this condition was kept. This happy state was brought about solely through the thoughtful application of a set of rules by the captain and the first lieutenant, who were seconded in their work by the other officers, and without relaxing for one moment the rigid laws of the navy. Every violation of the regulations was severely punished, but never with violence or show; it was with regret, a few words of advice, an injunction to mend his ways, an appeal to his sense of manhood, and the delinquent was awarded his punishment which was carried out to the letter. He was not branded; the road to regaining the confidence of his officers and the liberties he once enjoyed was open to him, and was graciously accepted. I have seen a man's face brighten as he heard his name read promoting him from the lowest to the next grade, his head would be held higher and his steps lighter as the captain would encourage his attempts to rise, by the simple words "I am glad to see your improvement, my man; I hope to hear your name called in the next class on the next mustering day." Interest shown by the officers in the men is always appreciated by the crew. A few friendly words to individuals, by the first lieutenant or officers of the divisions commanding them, such as, "Your boat looks well," "You did splendidly at drills to-day;" or a quiet word of warning, such as, "You did not do your best, Jack; I know you can do better, so try; I expect it, I expect to commend instead of chide you next time"—these are such trivial things that they are apt to pass unnoticed; small though they be, they bear fruit.

I served on a third ship—she was painted *white,* was swifter and in several ways more crowded and less comfortable than the

other two; she had electric lights, modern guns, and all the modern appliances of eight years ago.

The commanding officer was a strict disciplinarian, but broad-minded and generous—a Christian gentleman in every sense; his interest extended to every part of the ship; and he was supported by a good set of officers: above the average, I thought; perhaps not; but we were a happy lot and pulled well together; our crew was fair, but no better at the start than is met with in other ships.

Our first lieutenant was a man of tact and excellent judgment, with a full knowledge that conscientious work was worthy of notice; that unsatisfactory work to him, but satisfactory to the worker, depended largely upon the intelligence of the individual. His patience and encouragement were striking; his criticisms on every slighted job were just but never harsh, cruel, or abusive. In a dignified manner he gently pointed out the shortcomings, how the work should be done, and ordered it corrected; he would again inspect, commend any improvement, and if still not up to his standard would say "I will let it go, but you must improve on that."

At the beginning of the cruise it was announced that searching men on returning from liberty would not be tolerated; an appeal to their manhood was made, and the petty officers were told that they were expected to suppress any liquor smuggling, or immorality. This rule was observed for over three years, and I know that within a year there was not a good man in the ship who did not feel that his manhood and dignity were respected, and he was the happier for it. There were some toughs who took advantage and did smuggle liquor, on rare occasions; but these cases were few, or seldom brought to official notice; and the delinquents were most severely punished.

I know of several instances where the crew quickly suppressed a clique of short-time men, from other ships, who tried to introduce liquor. It was with our second commanding officer this occurred: he called the old petty officers aft and reminded them of his pleasure in continuing the good rules of his predecessor and told them that he expected them and the old crew to stop the matter at once. It was done; and for a few days we noticed some badly bruised and very meek-looking sailors, who were not of the old crew; but there was no more smuggling of liquor.

We had men who got drunk, but they seldom raised a row on board; what liquor they brought on board was in their stomachs. If any boisterousness were heard, the surgeon was appealed to, and an emetic cleared the stomach and quieted the delinquent. Three very bad characters were gotten rid of by sentence of court martial, and suddenly discharged and landed on the beach after being informed that every consul had been notified, and they could expect no help. The numerous liberties, the freedom of the special and first-class men, the interest in the men exhibited by the officers, the allowing of a certain number of pets, the presence of three good musicians, and the singing and dancing, produced a happiness and loyalty that was so marked as to cause jealousy among other ships of the squadron. After hard service, when the crew was quarantined to the ship for three months, we gave liberty in Hong Kong; and, I will mention, not a man overstayed his time; and the behavior of the crew was so exemplary as to elicit the most flattering remarks from the governor of the city and was commented on by the foreign residents of the place. I will say that nine warrants were awarded to the men of that ship's crew. It was only necessary to pass the word to "clean ship;" no further order was required from the officer of the deck; and she was cleaned in every department; she was healthy and happy. She will ever dwell in my mind as an example of what a ship can be made by a good, thoughtful set of manly officers who are loyal to their duties, and particularly a commanding officer who draws near him his subordinates, and a first lieutenant whose character is sufficiently broad not to repel a good suggestion, or offer, to help him in his varied duties. We need men who will impress every one with the idea that the ship's reputation belongs in part to them, and never allow them to forget that every loyal officer and man with a true sense of his duty in his heart is as much interested in the good name and condition of the ship and crew as the admiral or captain; if he fail to do all in his power to secure and maintain her reputation in every way, he is derelict in his duty. This is the broad spirit in keeping with our country's teaching that the ship and service are ours—not mine. This spirit should be instilled into the men, and I am happy to state that it was the prevailing spirit on that ship.

There is much that I have not mentioned, that bears upon the

subject, that I hope may still be spoken of by some one with an abler pen and more active mind. If I succeed in arresting attention, or securing a single advance in improving either the moral, physical, or intellectual standard of our naval personnel, I shall feel that my labor has not been in vain.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SOME NOTES ON NAVAL NEEDS AND REQUIREMENTS.

By Lieut. Henry C. Dinger, U. S. N.

Our naval needs are many and diverse and are ever being commented upon. Criticisms on present conditions of organization, supply and sufficiency are at hand in every direction, both within the service and without. We are confronted with the conditions of an official personnel far too small for the constantly increasing needs; and an enlisted force to be, as it were, created, trained and retained in the service. Our system of organization and methods of work are receiving assaults from all sides, by the press and from other sources, and, it is apparent that the actual present conditions are far from being all that is desired; nor do the present provisions for naval needs appear to be adequate.

The close rivalry between the various navies as to progress and new methods has developed a state where the striving after every possible improvement, or essential to progress, or superiority, is the aim of those interested.

It is under such conditions, where the powers of the organization and personnel are severely tested and stretched to something near their utmost capacity; where every one and everything is needed for all there is in them; that the defects and the bad features are more liable to show themselves. Likewise, under such conditions, the proper manner of supplying the needs and providing the remedies for these shortcomings can be better discovered. An unknown defect is not likely to be remedied. It is therefore not altogether a misfortune to find where our organization and supply of personnel and matériel is faulty. If defects exist they should be brought to light, and then the needed and most feasible and politic remedies could be applied.

A great danger produced by such conditions (where the present state of affairs is not viewed at all as satisfactory, and where shortcomings are being noticed on every hand) is that radical or ill-advised and unsuitable measures are more likely to be taken, which, designed to remedy by revolution, may only abolish what we have, and leave in its place something worse, thereby entailing a somewhat chaotic state which this nation cannot afford to have existing.

The general nature of the majority of our needs are known and have been known and pointed out by those who have given the matter thought, and who are those most interested in naval efficiency. It remains for those who have the power to produce and execute to set the remedies in motion, and for all others to aid in acquiring these ends by a united effort and not by disjointed working at cross purposes, generally engendered by disagreement on mere details.

ORGANIZATION.

The success and efficiency of any large concern depends largely upon its organization; the more complex the more need of system in carrying on its work. That the Navy Department is in need of an organization based on a more logical foundation than that under which it is at present operating, can hardly be gainsaid; but on what is actually needed there does not seem to be a unanimous and overwhelming opinion. There is, however, a tendency along certain lines which can be marked in many directions.

A general idea of what this is can be obtained by a perusal of Lieutenant-Commander Hood's prize essay contained in the March, 1901, number of the NAVAL INSTITUTE, and by numerous other articles appearing on the subject of naval administration. This would contemplate a general division of naval affairs; one relating to "Personnel and General Administration" and another relating particularly to "Matériel and Supply." In the first division would be embodied a general military staff, and several subdivisions, having direction of work now carried on by the Bureau of Navigation and by the Judge-Advocate General's office.

The division of matériel would have a head to be in charge of all matters of material and subdivisions under this division, corresponding to the Bureau of Yards and Docks, Construction and Repair, Steam Engineering, Equipment, Supplies and Accounts, and Medicine and Surgery, with the matters under the cognizance of these subdivisions somewhat more equitably arranged.

The desired outcome of the organization should be one harmonious whole though composed of many varied and diverse parts, but all fitting into the general mass and each doing its share for the benefit of the whole.

PERSONNEL AND MATÉRIEL.

Personnel and matériel are neither superior the one to the other. Though the fact of what "good men with poor ships" have done may be matters of history, it does not follow but what men as good as these in better ships might not have done more. But, moreover, if not limited by various restrictions, good men will have, and will cause to be produced, good ships. Poor men will cause good ships to deteriorate; while good ships will make good men doubly good.

Matériel and personnel are bound together, and they must be developed together; the neglect of points in either reacts on both. Both are appropriate attributes of the whole body, and defects in either will affect the whole. There is no such thing as the relative importance of the one to the other. Each is all important.

APPROPRIATE PLANS.

As before stated, general ideas on an appropriate naval organization are brought out in the general plan suggested by Lieutenant-Commander Hood, and from the discussions; likewise by the essay on Naval Administration, Admiral Luce, Naval War College; Navy Department Organization, Admiral Chadwick, No. 71, U. S. NAVAL INSTITUTE.

The plan of the organization must be based on the actual and probable needs and conditions, and a consideration of the ends to be accomplished, and not on a hypothetical system that does not take full cognizance of actual facts present, disagreeable though they may be, but none the less material.

NO RADICAL CHANGES.

One thing, however, cannot be overlooked, and that is a radical change should not be effected at once. Things must progress by gradual development; and a sudden change would simply bring all operations to a stand-still. But it would be well to know what the desired goal is, and then to work toward it by gradual evolution.

Perhaps, though the desired organization is never reached, if

it is outlined and known, changes toward that end can be gradually made. If the plan aimed at is not definitely known, changes may be made tending to work in an opposing direction. Many of the radical changes sometimes proposed and elaborately worked out, though having much merit, are impossible of immediate adoption in toto. Such radical changes might paralyze everything, destroy in great part what has been developed during the past years, and, left in its place, might be a system but not the means, ability or experience for carrying it out. The fact must not be overlooked that the conduct of naval affairs cannot be stopped to acquire a brand new outfit in the way of organization, but must be always in operation, and must acquire its innovations while on the march.

There can be no immediately radical changes. We must consider what we have already, and produce means for diverting this in the direction we wish to develop. Viewing the desirabilities in this light, and having in mind those changes which, by gradual evolution, will produce a desired organization, there follows now a discussion of the needs, system and procedure for the training of officers fitted most efficiently to perform the various duties in the navy, while yet not making it necessary for any violent change that might disturb the operation of present naval routine.

GENERAL REQUIREMENTS IN CONNECTION WITH THE OFFICIAL PERSONNEL.

To obtain the general and material requirements of the navy necessitates the product of many resources and entails the need of widely diversified knowledge, experience, talents and abilities; and though the whole must be under one system, controlled by one power, and tending to one end, its parts must be intelligently grouped in naturally-connected, suitable, general divisions in order that the various special features may be developed. Such division to be governed by the natural grouping of kindred parts and by controlling circumstances and conditions.

The immediate control of all matters is in the hands of the official personnel, and must there be apportioned.

In the production of the navy we must have vessels built, equipped and manned, provision for their care and manipulation, repair and sources of supply, and an executive and administrative control over all.

CONSTRUCTION BRANCH.

To produce the construction features of the vessel we must have a constructive branch in the official personnel. This entails a specialty of wide field, requires specially trained, general and technical, knowledge and experience. The groundwork of a general naval education and knowledge is best brought into being by a course at the Naval Academy and some experience at sea. The purely technical education must be obtained by a special course, and the special training by actual work in shipbuilding and designing.

The actual productive work of the constructor must, of course, be done on shore, and there also must be gained the experience in methods of building and designing. But in order to know the ends his work is put to and the practical limitations presented by service conditions at sea, he should spend, from time to time, periods at sea, in actual service. Unless this is done to some extent, he will not know intimately the conditions that his handicraft is put to, and cannot as well realize the necessities to meet them, or the comparative utility and sufficiency of various portions of material under his particular cognizance.

The duties of naval constructor at sea are now defined by the naval regulations, but none go to sea, owing to the extremely limited number. This number should be sufficiently large to enable certain periods of sea detail to be maintained and that all other work coming under the cognizance of this branch be efficiently carried out. The turning over to non-naval men any part of the direction of this work cannot but lead to the production and the fitting of vessels not best suited for the purposes required.

The selection of candidates for this branch should be based on their fitness and special abilities for the position, which can be better ascertained at a period somewhat later than immediately after graduation from the Naval Academy.

ENGINEERING BRANCH.

Another division is the engineering branch. To this branch must be given the cognizance of all engineering matters, except some details which would naturally be more closely connected to other branches cited below. The personnel of this branch should be required to have a special knowledge, ability, training and

experience. Owing to the fact that the material on board ship belonging to this branch is not passive, as is the case with the construction branch, but active, the peculiar services of this branch are more needed on vessels in service for supervision, care and operation.

These needs will require a larger percentage of officers at sea than on shore, and this makes it, what may be called, a sea-going branch. It has consequently more in common with the elements of life on board ship than has the construction branch, and the need of a more general sea knowledge and training can be seen. However, the nature and sphere of duties are in a very large measure quite distinct from those of the line, or executive branch. The need of a distinct branch and a separation of duties from the line in order to carry out this specialty is apparent.

The sequence of education and training for this branch would be general education and training through Naval Academy course, and for several years at sea, then selection and separation as far as duties are concerned only, from the line, a special course, and then confinement to engineering duty.

The same need for sea experience in those directing the design and building of engineering material applies as in the previous case, only in a much greater degree. This need is so important that any proposition to turn the direction of design and construction of engineering matters over to civil, or non-naval men cannot be considered; and this is one great flaw that can be found in a number of foreign naval administrations.

Because civilian engineers build merchant ships and their machinery, it does not follow that they make the most desirable persons to direct the construction of naval vessels. In order to know what to build, they must be intimately acquainted with the special needs and requirements, which are only fully learned by experience in men-of-war at sea.

ORDNANCE.

This branch is still more closely connected with matters of a sea-going nature and the executive duties. It requires peculiar technical knowledge in developing the design and constructive features which can quite monopolize the special abilities of a body of men. Hence for what may be termed "technical ordnance work," there should be a special branch, specially fitted for it,

who would then always do this work on shore; and at sea, where it is concentrated sufficiently to make use of the services of an officer so specially fitted.

It is a branch that has as wide a field as the others, but its environments and requirements lie more closely and naturally with the duties and requirements of the executive, or line branch, and, owing to this fact, it is not believed to be necessary that those who are to carry on the special work of this branch must be separated from the executive. Above all it is necessary that those who are to design and produce the ordnance material should be intimately connected with the conditions on board ships in service.

NAVIGATION.

In order to develop the higher, or what might be called the more technical parts of the general subject of navigation, there should be certain officers who have made this more of a special study than would be necessary for the ordinary practical work of navigation, which all line officers must be familiar with. The work of such a branch would lie closely in the atmosphere of executive duties, and, as is the case with ordnance, there appears to be no special need for a separation from the line. But the special work under this branch, which is so greatly needed and important, not only to the navy, but to all sea-faring people, requires the direction of those specially trained for it, and for this reason certain officers should be selected to pursue this specialty, in order to insure the utmost development along this line.

The work of this branch would include, the supply and fitting of vessels with instruments of navigation, hydrographic work, pilotage, the compilation and distribution of nautical and other astronomical information.

The personnel of this special branch would go along the same lines as that of ordnance, except that there would be special training in navigation and confinement to this work on shore with executive duties afloat.

SIGNALS.

This question is full of vital importance; to investigate and develop most fully the problems it contains, and to provide for the most efficient systems and apparatus for doing its work, there should be officers specially trained for this purpose. In this term

are to be considered the general subject of signal communication in all its attributes. It would thus include the development of wireless telegraphy, the development of all systems of signals, as well as preparation for and the direction and training of the signal force.

Those to specialize in this subject would, like the two last, not be separated from the line. They should be given such special training as is deemed desirable, and would carry on the special work, as well as being, in part, available for general line duty.

TORPEDO SERVICE.

This service requires special ability and training, and should have a special branch to perform its work, if any great progress or efficiency in this line is to be attained. Officers for duty in this service, and they alone, should take the special course at the torpedo school, and those qualifying there, and not others, should carry on torpedo work in its various branches. When not assigned to duty in general service at sea, torpedo officers should be confined to torpedo work, which would consist of duty with the torpedo-boats, mines, etc., the design and production of torpedo equipment and in charge of the torpedo outfit on large vessels, where the installation is of sufficient magnitude.

Torpedo officers need not be distinct from the line, but should have a special torpedo training, and it would suffice to assign a number of young officers, depending on needs and conditions, to this specialty. They should be so assigned within a few years after leaving the Naval Academy, for it must be borne in mind that torpedo work afloat can best be carried on by officers when they are still young.

If the navy is to have a well developed torpedo service, a definite torpedo policy must be present, and a definite torpedo training, for both officers and men, must be devised. The particular features of this subject have been particularly well set forth recently in the essay on torpedo-boat policy, Lieutenant Beach, U. S. NAVAL INSTITUTE, March, 1903.

EXECUTIVE.

We now come to the duties of the executive, or line branch. In the main, these are general and administrative. The officers to perform these duties are all those not selected for the separate

divisions, and include the ordnance, navigation, torpedo, and signal specialists. In the beginning all line officers who pass through the Naval Academy do line, or general, duty, but, as they go on, certain ones are selected out for the various specialties. This produces the desired result of having a relatively large number of line officers in the lower grades. Where many are needed, and, by taking a considerable number away from the exercise of the higher line duties, it also serves to make it possible to reach these positions while not too old.

The executive branch would have charge of general administration, and on shore would be the means by which general naval requirements and policy would be executed. On board ship they would have the general control, the handling of the vessels, and the general administration of affairs. As far as the direction of general affairs are concerned, all branches must be subordinate to this branch, but the chiefs of the various special branches must be consulted and their recommendations and suggestions followed out.

It is seen that the greatest portion of such duties are in the main general, and that a larger proportion of officers is required at sea than on shore. It would, however, not be unreasonable to expect nearly every officer from also becoming proficient in one of the line specialties, ordnance, navigation, torpedo, signals, which are all intimately connected with the executive duties.

The exercise of the higher duties of the executive will consist in that which relates to naval tactics, general control and organization and direction, international law, intercourse, and policy.

To specially develop these matters we have the Naval War College, and it would appear that the most suitable time for taking the course there should be just previous to reaching the rank for detail as executive, or commanding officer. The subjects treated by the War College need not, of course, be confined to purely executive matters. Lectures by various specialists on special features would be one of the most important parts of the course.

It ought also to be recognized that any line officer who fails to come up to the essential requirements needed for a commanding officer should be retired or assigned to some duties that he is capable of performing. If any officer should be up to the best requirements, it is a commanding officer; yet in practice, how often, due to physical ailments and numerous other causes, is the

opposite the case. In some other navies, officers for command rank are selected for promotion. This prevents those not qualified from reaching the higher grades, but it also prevents many deserving ones from obtaining promotion.

Retirements, under various conditions, where there is a failure to come up to all the desired qualifications, will prevent, both the deserving from being left behind, and the highest grades from being filled by incumbents not capable of properly performing all the duties incident to these grades.

Very often this incapacity may result from no fault of their own, and in these instances, retirement may work what might be considered some hardship on individuals, but in such matters the good of the service should be considered.

It is for the general work for the exercise of line duties and general naval knowledge, that the course of the Naval Academy should be designed. The specialties should be, and can be, much better developed later on. Only those who remain in the line could reach the positions for the exercise of high administrative control of ships or fleets, and stations on shore. For this reason suitable compensation might be made for those specialists who thus give up their chance of ever obtaining this goal to many ambitions.

FISCAL AND ACCOUNTANT BRANCH.

The duties of this branch may be considered as quite distinct from the others, but are yet intimately acquainted with all manner of service conditions. It is a sea-going branch, and its duties are peculiarly naval, and the need of general naval knowledge is at once apparent. It should be, as it is, a separate branch, but if the new officers of this branch would be given some preliminary naval training before being given their responsible duties afloat, it would certainly conduce to their general efficiency, and make it possible for them to enter upon independent duty with more confidence and fewer misgivings than is now often the case.

MEDICAL BRANCH.

The distinctness of the duties of this branch is at once manifest. The medical officers must be obtained from the civil medical colleges, but a comparatively short course, as has from time to time been established, in matters specially pertaining to the service, would do much toward preparation for duties at sea.

SPECIAL NON-MILITARY BRANCHES.

Certain non-military special abilities are required in conducting various matters in connection with the naval establishment ashore. These may require the services of several special professions, which it might be advantageous to organize into permanent and recognized corps. These are at present represented by the civil engineers, whose duties, in connection with the erection of buildings, and the general maintenance at naval stations, are manifest.

By astronomers for duties at naval observatory positions now in part supplied by professors of mathematics.

The professors in the non-military branches at the Naval Academy might be regularly organized into a special corps. Whether this would be advisable might be a matter of question to some.

In the process of development other special services may be needed, and it might be advisable to organize those who perform them into a permanent body.

GENERAL SYSTEM FOR EDUCATION AND TRAINING.

In the general idea for a division into the various branches of the commission officers (except the medical corps, chaplains, and the special non-military corps), the needs of a common training and general naval knowledge, to a certain extent, is first to be recognized. Then the need of specializing in the various directions must be considered, and those thus specializing should be so recognized. Lastly an entire separation of duties when necessary and expedient.

The first training at the Naval Academy should be the same, a groundwork for naval education; then, general experience at sea, and finally a division into the various special branches.

PREPARATION AT NAVAL ACADEMY.

In order that one harmonious whole may be produced, those things that all have in common should be taken in common. The attainment of the common knowledge should be begun at the outset, and all should start at the Naval Academy. The standard of admission should be so raised that all elementary subjects should be covered by the entrance examination, and the subjects taught at the Naval Academy be those peculiar to the naval profession. This would result in discarding from the academy

course a great many general subjects that are perhaps better taught in the various educational institutions throughout the country, and which candidates for admission should be required to know. The instruction should not go too deep into specialties and research, and should be designed to fit for the essential and practical needs of the service. Special features, and the intricacies of more advanced work, should be taken up later in the special post-graduate courses.

The duties of pay officers will require a less amount of the peculiarly military knowledge, and more of an accountant and commercial nature, considerably different from what the other branches need. It might thus be advisable for the candidates for the pay corps, if obtained through the Naval Academy, to be separated during the latter part of the academic course to pursue special study in their particular duties. On graduation they could be assigned for a time as assistants, and then to independent duty.

SELECTION AFTER GRADUATION.

The candidates for naval constructors should serve, after graduation, some period at sea in general duties, and then should take a special course in naval construction, and be permanently assigned to construction duties as a distinct branch.

The candidates for engineering should continue for several years in general service, and then those specially fitted for its duties be given a special course in engineering, and then assigned permanently to engineering duties.

The other special branches would be what might be called line specialties, since in their work on board ship they are more intimately connected with line duties.

Officers peculiarly fitted or adapted for any of these branches would be selected and given such special training, or course, to develop these specialties; and the special work would then be conducted by those specially fitted for it.

This assignment of the official personnel into special branches can be carried out, both under the present organization of the Navy Department, or under other systems contemplating a general staff and division of personnel and divisions of personnel and of matériel with various subdivisions. The special duties being simply performed by those designed to be best fitted to

perform them. It is really what obtains now, in a haphazard fashion, brought to a systematic application. The great advantage is that it furnishes an incentive to excel in any one of the special branches and the knowledge that such excellence will be made use of, and in providing some means by which officers may be assigned to do that which they can do best. Under the present operation, how often are not duties performed on board ship by many doing that which they know least well while not being called upon for that which they do know? The patent fact of spoiling a good engineer to make a poor deck officer, and vice versa, is manifest in numerous instances.

RESULTS OF SUCH DIVISION.

Going on the above lines, the relatively large number of watch officers compared with those to exercise command would be provided for. As junior officers and watch officers they would be gaining the knowledge and experience that all need, and by then leaving to go into the special branches, a relatively large percentage of watch officers is obtained, and this would serve the means of obtaining billets for command while still some years before retirement.

The principles must be, to recognize all needs and to make a proper provision for each, putting each part or portion in the place and condition best suited for it, and where it may develop to the best advantage toward the upbuilding and general efficiency of the whole. The result of these measures will be to put, as near as possible, each one belonging to the personnel in the position that his talents best fit him for; to produce conditions tending to the development of the talents and abilities needed, and to use those abilities that naturally present themselves. General conditions must be met in a general way, special in a special manner.

Plans of any large organization must be based on an exhaustive knowledge of the ends to be accomplished, means at hand and the actual and probable conditions presented and not on theoretical hypotheses. Unless the ends sought are at least known in a general manner, confusion will, of course, result.

There must be a division into special branches, and this must be definitely recognized and provision made accordingly.

LEGISLATION.

To follow out these logical needs, new legislation is not absolutely necessary; it can be done by enactment within the Navy Department, if only some permanency can be promised. Legislation defining general terms might be better, but only the general outlines should be defined by laws. Laws are not elastic.

PROVISION FOR SPECIAL REWARD.

In order to provide suitable reward for special efforts, extra compensation for the performance of special duties, or the possession of special attainments, should be given. A special qualification, or rather a special result being the means of obtaining a special reward.

This is a detail that can be equitably adjusted unless the question of personal jealousy and covetousness can command more interest than the general efficiency. But if a gun captain receives so much more for special ability, a coxswain of a steam launch extra compensation while doing that work, why should the reward of special efforts and ability among officers incite envy in those not having them. If the rewards are the results of extra effort and work, jealousy or discontent should not result. There has been and is at present considerable inequality in pay, due to the provisions of various laws; no individual jealousy on that account is really apparent, but these present discriminations for the most part are not based on extra abilities, or the performance of special duties.

In considering these questions, the facts, and the actual conditions that apply, must be considered. These things cannot be based on sentiment, prejudice, nor on traditions. Temporary feasibility, individual ambition, or benefit, should not be the deciding point, although the presence of these matters must not be disregarded. The general good and efficiency of the service, and not that of the individual or of any one class, is the point that should decide methods of procedure.

In the above, there has been an endeavor to give only a general trend, the details affecting the various branches must, of course, each be worked up in time, and this should be done within the navy, and not require special legislation for every change. Legislation is, as a rule, an unwieldy weapon, and often results in defeating its own purposes.

PERSONNEL LAW NOT ENTIRELY ADEQUATE.

The personnel law provided much that was desired but it is not complete; it only goes part way and then leaves things to chance or further development. Further development is now what is wanted. The personnel law has reached nearly the desired point in providing for the general features, education and training. The next thing is to make proper and adequate provision for the special features and training. The direction in which this should be done is indicated above.

The development toward it should be immediately begun and continued at as rapid a pace as modified conditions can adjust themselves if progress is desired.

PARTS ALREADY PRESENT.

The embryo of the various special schools are all present. We have a torpedo school, a system of compass and navigation instruction, as well as a forerunner of an ordnance school and engineering school. It remains to gradually direct and develop these into something definite and systematic.

We have in the service our engineer, ordnance, navigation, torpedo and other experts; but they are all in the general mass, and a great many are likely to be lost in it. However, if these are brought into groups for the purpose of developing these specialties, the various specialties may not have to try a grab bag game to obtain those desired for their work.

TRAINING OF MEN.

The importance of a training service, is generally recognized, and means and systems are continually being evolved, submitted and discussed. In this connection there are a few points that ought to be recognized and considered in developing any system.

1. That the training should consist in training the men for the duties they are to perform and not for something else. There is sufficient work in doing this and it would seem that the training of men to do that which they are not likely to be called upon is a luxury that might be dispensed with. There are certain things and a certain amount of training that may be alike for all at the beginning, but a point is soon reached where paths must separate for there are too many things to develop to require all men in the service to have the same abilities and qualifications.

2. That the real and finished training is that which is received in actual service. That a certain amount of essential general knowledge and training can be obtained more quickly or more easily in barracks at a station or in special ships cannot be controverted, and it should be done. That better facilities can be provided at certain places for the development of special lines is likewise true; but that the development of the all-around man in the various specialties that he is needed to serve on vessels of war, is to be obtained aside from the regular service in regular cruising ships, is hard to believe.

The special training service can only teach a few general preliminary and necessary points of knowledge about naval life and duty. It is simply a preparatory school. The real training and development lie in the cruising ship.

3. The training service should be such and nothing else. The use of training ships for regular duty is destructive to their functions as training ships and it also produces a likelihood that duty, whatever it is, cannot be done as well as if by a cruising ship designed for the purpose. The tool must be fitted for the work.

4. That some definite and not ephemeral plan be arrived at. About the only definite system of training that now actually exists is the apprentice system and the system of training seamen gunners. These systems may have many shortcomings, but they are something definite and from them we have definite results. Though other schools, such as schools for mechanics, electricians, yeomen, etc., are established, they lack definiteness and though there are many causes for a lack of definite system, it cannot be gainsaid that the remedies lie within and not without the navy.

There have been many valuable plans of training proposed, but all cannot be adopted and the practice of having now one thing and then another as a new suggestion comes up, leads to nothing and serves only in many cases to discredit good and efficient systems through not being followed out. There must not be an endeavor to do too much. Something fairly feasible and simple can at least be adopted, and then, if necessary, can be modified gradually. Frequent revolutions of entire systems must be avoided.

The idea that a vessel can at the outset be supplied with a crew

of veterans, of men experienced in all their duties, must be laid aside. The new men must be put on board of our vessels just as soon as possible and there taught and trained to do that which they are designed to do. It is only on board actual fighting ships that the knowledge and training desired can be obtained.

FLEET EFFICIENCY.

The efficiency of the fleet will of course be largely dependent on the character, armament and equipment of the vessels and the experience of the personnel. But these points of material and supply may be apparent, and still it may be a weapon that will fail ingloriously in its purpose.

Examples of this in naval warfare were perhaps numerous even before the dawn of history. The battle of Salamis, the naval battles in the Punic wars, show how in ancient times this fact obtained. Continuing to modern times we have the defeats of the Spanish fleets at the hands of the English during the 17th and 18th centuries, and the defeats of the French fleets somewhat later. In our own times we have a most striking example in the battle of Lissa.

The question may be asked, What is this great attribute that seems thus in many cases to bring victory to one side against apparent odds and that has enabled the less better equipped and experienced of the combatants to overcome the other?

Is it not that there are qualities productive of victory that are not so visible and manifest on the surface which cannot be weighed and figured upon in concrete terms with definite values? They are what may be termed psychic attributes, and their value is overwhelming. In their development lies a field for effective results.

Among these we have:

1. An effective organization.

2. A fighting spirit animating everybody and inducing everyone, from admiral down to the lowest man, to exert his greatest effort in the most effective and intelligent way.

3. A knowledge on the part of those in control of what is to be done, how best to do it with the actual means, a knowledge of those means, and a complete, definite, unvacillating execution.

5. The utilization of all methods, means and circumstances, both previous and during the engagement solely to the accomplishment of the result.

6. The dispensing with all matters subsidiary to, or which do not help to obtain, the point aimed at.

The reasons for defeat, on the other hand, have been:

1. Lack of system and plan of action.

2. Lack of a genuine fighting spirit.

3. Ignorance of the resources and abilities of the enemy and of own insufficiency.

4. Lack of general confidence.

5. Insubordination and jealousy, and the following out of individual desires and ambitions at the expense of all.

All great naval actions were largely won or lost in the days of preparation. To show how this obtained at the battle of Lissa, two extracts of Lieut.-Comdr. Sears' article on the above battle are given.

"The Rear Admiral (Tegetthoff) summoned all his captains on board, learnt their views and general condition of vessels. And then fires were drawn and the machinery put in shape." And

"Persano made a signal which was not generally understood by his captains; had it been understood it could not have been generally obeyed, several ships not being ready."

The conditions that produced victory and defeat are stated in these two extracts.

The efficient fleet must have a commander and staff who have natural abilities in the control of affairs, a wide knowledge of the conditions and limitations of both their own and the enemy's and of the general conditions underlying. The Commander must be one who will inspire confidence, obedience and fidelity in all; who is not antagonistic but whose influence will tend to produce something akin to what Nelson had when he describes his captains as a band of brothers; something that will engender the devotion that Napoleon inspired in the hearts of his marshals as well as soldiers.

The all-pervading spirit that attracts victory and knows not defeat is enhanced by patriotism, by the love and admiration for the proud traditions of the service, by general contentment, and, by the high conception of the performance of duty.

QUALITIES OF A FLEET.

The desired qualities of an efficient fleet may be grouped under the following general heads:

1. Fighting ability. This means expertness and accuracy in

the handling of the offensive weapons; their care and their preservation in an efficient state; the supply of ammunition; and, in fact, the highest development of the art of naval gunnery.

2. Ability to move, maneuver, and act in concerted action. This implies expert ability in the handling of vessels; knowledge of their maneuvering qualities; the development of the best means of signal communication and the prompt execution of signals; the maintenance of the mobile qualities of the ship, and all matters and material that affect these qualities, in the highest efficient state.

3. Source of supply and repair. This is to ensure endurance. It can be easily seen that these features are even more important than the commissary is to an army in the field. Some of these features are contained in the vessel themselves, but they must be supplemented with such accessories as efficient colliers, supply and repair ships and facilities for repair and supply on shore. It is feared that there may be danger that consideration for these matters may be given on the basis of the needs of peace and not of war.

The system of supply must be simple and move with despatch, and to this end the multiplicity of papers, vouchers, etc., that may often be required in order to have work done or to obtain needed supplies, are handicaps that should be dispensed with wherever possible. The rendering of the correct account should not come to be considered of more consequence than the obtaining of the needed supplies or the performance of necessary work.

The needs of these features are, no doubt, generally appreciated, but care must be taken that the provisions supplied do not exist in name only. Providing a vessel and calling it a supply ship does not necessarily make it an efficient one; what is provided within that vessel and the facilities it has for bringing this to those who are in need, are the important considerations. Bases of supply must be something more than mere geographical points having strategic position. A barren island may be very important strategically, but if it cannot supply that which is desired, give succor in need—or which requires abnormal measures for its existence or defense—its efficacy may be very small. A base should be a place for refit and rendezvous, for obtaining supplies and making good deficiencies, and according as it is able to supply these needs is it valuable. The facilities are of more value than the position.

A few bases well equipped for the purposes of actual needs are much better than a great many that are bases but in name only, and which would be entirely unable to meet demands likely to be placed upon them.

With the development of navies on the present lines the relative importance of these fleet auxiliaries as they may be termed, will be increasing. They cannot be brought into existence at once. Their development lies mostly in shore work and must be prepared beforehand by those having knowledge of probable needs.

To put a fleet to sea without providing for these sources of direction, supply and maintenance would be like cutting the rope by which one is held suspended. That these parts are an important part of the navy, and require the attention and direction of naval people is a matter that ought not to be lost sight of.

If adequate provision for these matters are made in times of peace, the needs somewhat definitely known and means for them planned; they can, of course, be greatly augmented and brought into greater activity when needed. It is in this extension of activity that there lies a great field for the efficient utilization of a volunteer or temporary force. Work connected with these matters is not so much of a combatant nature and those ordinarily engaged in the pursuits of peace could at once turn their same handicraft to the supply of such needs. But the manner and means must be provided and planned beforehand, and they require time to produce.

INDIVIDUAL SHIPS.

The efficiency of naval power will depend in the main on the efficiency and sufficiency of the individual ships. Though the organization of the fleet may be excellent, if the vessels are lacking in their inert individual qualities that make them each individually and separately the most efficient fighting machine—the essentials are then lacking.

The ground work of naval strength is the ship, if each ship has attained the highest state of efficiency, the work of preparation for battle has, in a large measure, been accomplished.

This state of efficiency will depend almost entirely on those on board and on the commanding and superior officers will devolve the responsibility for it.

SALIENT POINTS AFFECTING SHIPS EFFICIENCY.

Indications of a more general awakening regarding the salient points of the ship as a fighting machine have been appearing. These various points are being continually called to our attention by the many practical and well thought out articles appearing in various service publications in which the special needs are discussed together with means and methods for obtaining the important results aimed at. But it yet remains for a great many of these things to be thoroughly recognized and intelligently acted upon by the general service.

That important items in connection with these matters have begun to receive their proper attention is shown by some examples cited below.

The renewed interest in gunnery is bringing into use thoroughly efficient, effective and feasible methods for its general development for actual service, as well as experience for arriving at the best way of fitting and handling the appliances connected with the working of the battery: and thus is making this the important point in a ship's work and routine.

A recognition that watch standing is not the all-essential duty of the division officers, that petty officers are something more than more experienced hands and that to them can be turned over some of the minor responsibilities and training of men in lower ratings, shows that there is progress in this direction.

The awakened interest and the resorting to the real, direct, feasible and productive methods to develop the essential things that produce fighting efficiency under present conditions must be extended to all matters affecting it and these developed together.

Besides her ability to shoot straight and handle her battery well, a ship must be well handled and this not alone by her captain but by other officers. Her mobile and maneuvering qualities must be experimented with, developed and known by all those to whom this may be entrusted. She must be able to send, receive, understand and execute signals readily by the most reliable efficient and handy means that can be devised. All her various parts, fittings and machinery must be kept in shape for actual use, and, the means and methods for their care and operation, developed to the highest pitch in the most improved manner. She must contain provision for accident and injury and repair, and the resources and appliances for these purposes must

also be known and understood. There must be an efficient organization under which the various items that go to make up the whole are bound together in mutual support, and general harmony, and discipline that entails prompt, faithful and complete execution of orders.

ALL PARTS DEVELOPED TOGETHER.

In considering the efficiency of a ship, it must be regarded as a whole; every part, portion and detail must be developed to the highest efficient state; no one thing must be produced at the expense of others. When this is not recognized and followed out, the result is a one-sided or abnormal development, resulting in ability to do some certain thing extremely well, but perhaps lacking the necessity for bringing this ability into use.

Though specialists and special features must be most highly developed, the ship as a whole cannot be an ultra specialist except a specialist in the whole purpose for which she was built. Hence the one-hobby man will not and cannot develop an efficient ship; he may develop a certain line, but others are very likely to suffer. Every detail must receive all the attention possible, and it is to be found that perhaps each can best be developed by each affording to the others all the support and encouragement circumstances will allow.

SHIPS ORGANIZATION.

The organization of the ship should be such that (1) everyone knows what is to be expected of him and that he has a conception of what he is responsible for. (2) That the division of duties follows the most simple, natural and just order. (3) That all rules are simple, not difficult to understand, and that they require no hardship and as little inconvenience as possible. (4) That rules be a safe guide and that the regulation way should be the most convenient and effectual. (5) That all rules when once laid down be either strictly held to or abolished.

The first is perhaps the most important of all for unless any one knows what he is to do, how can he be expected to fulfill his duty well. Things must be easily understood; any great elaboration is useless when it will not be understood and interest in doing will be lost. The phrasing of any order with elaborate and long modifications, thereby making it less plain and simple, detracts at once from the likelihood of its being properly obeyed.

The organization must be elastic so that it can accomodate itself to various conditions and that, when new or unusual conditions are met, everything will not be immediately upset. Here again we are brought against the bad feature of undue elaboration and the utter uselessness of having a definite and inflexible rule for matters that are always variable.

The whole idea should be to have simple rules covering, as far as possible, all general questions affecting routine and duty and, to carry out these rules in all cases. Make these rules elastic where necessary. If a rule or order will not accomodate itself to the necessities of the case it will be violated and a generally violated rule had better be abolished since its violation engenders a general disrespect for all rules or orders.

It must not be overlooked that the observation of rules and regulations is not the end, but that the rules are simply a method for better obtaining the end. It is the blind and literal following of rules without consideration of the end in view that is the cause of so much useless and inefficient work, inconvenience and often useless hardship. There may be even cases where it has been stated that this or that work would be done just to follow out orders or that there would be plausible grounds for making a desired report. Anything done in such spirit, simply to follow out the wording, while violating in every way the whole spirit and intent, is worse than undone. Any regulation that tends to produce such obedience is likely to be faulty and, superiors that regard such performance in carrying out orders in a better light than a frank admission of non-performance with reasons therefore, cannot expect to have duty performed and obedience supplied in the spirit that it should be done, nor the proper respect and fidelity of those under them. Any conscience that the literal obedience of an order will pacify which, while in doing so, knowingly condones a violation of the spirit, purpose and intent, is akin to the hypocritical.

The cause of faulty performance lies largely in the way excusable failure to perform and a bluff at performing are regarded. All men are human, and the natural line of least resistance is very likely to be followed. The solution is to make the line of least resistance the right line.

CARE AND CONDITION.

The responsibilities for the care of the ship will devolve on the higher officers of the ship; the aim in this respect should be maintaining all parts in the most efficient state, providing for their preservation and preventing deterioration. This must be intelligently recognized and understood. Often the very efforts originally designed for these purposes have been developed, so as to produce the opposite result; an example of this is the wear on gun mechanisms by mis-directed cleaning of bright work. These counter effects are often lost sight of, and the desire for superficial appearance is responsible for an innumerable amount of deterioration. How much unnecessary and laborious work has been done to secure a good appearance, while the overhauling and preservation of parts has suffered. By the way the commodity, paint, is often used, an observer would hardly recognize the fact that the primary reason of its application is for preservation and not for appearance.

Often the outer surface of certain appurtenances is kept profusely bright and pretty while the inner working of the concern, the reason for its being, is practically unknown and not looked at—likewise the appearance of various mechanical devices and not their efficient working may appear to be the chief point. How often has not the matter of looks in various devices prevented their efficient manipulation? The effect of a desire for superficial appearance may be illustrated by an extreme case. On a small vessel, a young officer was placed in charge of the Engineering Department. Having due regard for the points that would impress the Captain, he gave his orders to the chief machinist that he did not care whether anything down below was in working order, but that bright work must always be kept in good shape. On inspection, this officer may have received the compliments of the Captain, but the proper working of the machinery may have been a different question.

The craze for smart appearance is a most potent cause for the deterioration of many appliances on board ship; a lack of real practical mechanical knowledge governing conditions and a conception of its importance is another.

The proper care and preservation of parts and appurtenances on board ship can only progress when those officers who are responsible for them and operate them are intimately acquainted

with their needs of service and the proper methods to be used in maintaining their efficiency. In these things there is great room for development; much has and is being done, but a greater and more general recognition of these facts is necessary.

The work of overhauling and repair is most important in keeping a vessel in efficient shape, and those who are responsible for its care should be allowed ample time and facility for doing it and must be encouraged, not hampered in their work by out of date restrictions as to the time, manner and place of doing it; nor should the overhauling be the province of extra duty men, or apportioned to odds and ends of time. If a vessel is well cared for while at sea, the necessity for navy yard repair is decreased, and the practice of allowing things to go until completely gone, with the idea of having the whole thing renewed at a repair station, is hardly conducive to the desired results.

This should not be encouraged by such a state of affairs that often the only way of a vessel being relieved from arduous and undesirable duty is the necessity for repairs, and the maintaining in an efficient state a reason for the continuance in such duty. Such practice merely sets a reward for neglect, and a punishment for proper care and zeal. It must also be recognized that the preservation and care of a ship does not consist solely in scrubbing decks, cleaning bright work, and applying paint.

The care of ships appliances must be learned in general by the petty officers and men, and must not be allowed to remain solely in the charge of a few mechanical specialists who are not supplied in sufficient number to do all the elementary work, and can only care for certain special features. The men of the crew must be brought up with the idea that ships work is for the purpose of care and preservation and retention in efficient condition, and not simply for appearance and the execution of certain orders. With the new development in all classes of ships material, means and methods for the care and preservation are new and changing. The transition to the more mechanical has progressed far and will go further. The practical mechanical scientific considerations governing care and preservation must be generally recognized, and given by the directing officers the attention that their importance warrants. General knowledge of these matters must be dispersed.

It should be considered as a principle that, those who are to

handle the appliances and whose reputation and even life depend on them would be most interested in their proper condition and would do most toward their being kept in good shape; and among such must be distributed knowledge and training in the manner of applying means for preserving such efficiency.

ROUTINE AND DRILLS.

The routine on board, the nature and extent of drills and the apportioning of the ship's work should be governed by the intelligent application of the means available for the end sought. Therefore the non-essentials should at once be put aside, the heirlooms of the past, though they may have been well in their day, must be dispensed with. That modern production, the ship of war, cannot be well controlled by the ways and methods of years ago. The general principles, the basis of organization, the general features for the attainment of efficiency do not change; in the course of time the knowledge and conception of them changes. But the methods and means for their attainment, the conditions governing their application, are varying continually and are ever developing along new lines.

There should be no reason why old rules, methods and traditions should be adhered to when the causes for their existence and the things which they regulate have disappeared.

The routine should be adjusted that the really essential things viewed from the latest and most progressive standpoint are the ones that receive the major consideration. The spick-and-span outside appearance, the whiteness and spotlessness of the quarter deck, immaculate paint work, and mirrored bright work, the ultra-dressy appearance of the crew, the exactness and stiffness of military functions, may be all right when in striving after them the really important things do not suffer neglect. But they are not the aim, the essential points that should be mostly looked out for. We may laugh at the Chinese soldiers, armed with gongs and flags, but are there not many things that we civilized people retain which have about as much efficacy for fighting purposes? Broad-sword, pistol drill, and setting up exercises may be good gymnastics but certainly should not take the place of essential drills designed to train for action; these things do develop qualities of handiness and alertness, are a good exercise but should only be made use of in this light.

The routine should provide for working, drill and also recreation periods, and the latter should be as little encroached upon as the others. It should be capable of modifications to suit changes in weather and governing conditions, the same detailed routine may not be well carried out both on a first-class battleship and on a small gunboat; in the arctic regions and in the tropics.

WORK AND WORKING PERIODS.

The constantly present work should be determined and then apportioned out both as to times and division of labor, so that everyone may know what they are to do and the proper times for doing certain work. If there are regular times set for the doing of routine work it is less likely to be neglected or to interfere with other matters.

DRILL.

The important matters to be developed by the ship's company by means of drill may be stated as follows:

Drills for Developing Offensive Qualities.—Under this will come all matters of drill connected with gunnery, the supply of ammunition, the exercise at general quarters and clearing ship for action. These are the drills that ought to have the major consideration and on them should be devoted special attention.

Drills to Provide for Emergencies.—These are fire and collision drills, abandoning ship, handling of life boats and rescue of drowning and the organization of fire and rescue parties. Though not directly concerned with fighting efficiency they serve to train for quick, rapid and concerted action in emergencies and guard against the worst features of disasters liable to occur.

Landing Party and Boat Work.—These matters are connected and are taken under one head.

In boat work we have what is left to-day of what may be called the old seamanship, and it offers a means for developing the true seaman's acquaintance with wind and wave and the forces of nature on the sea. By boat work coolness, judgment and alertness are developed and the efficient handling of the ship's boats is still, as it always will be, one of the telling qualities of the efficient man-of-war. The handling and the appearance of the boats shows the state of things in general and in boat work we have the means of developing the old hard-fisted, clear-

headed seaman, qualities so often sighed for. As long as a vessel's boats are intelligently used there will not be any special need for producing something artificial to obtain the qualities that sail and spar drill did produce in days gone by.

The landing party should be organized primarily for landing under actual service conditions and to this end it should be fitted out and the men instructed. Precision in the manual of arms and parade should not, however, be the chief points to have in view.

Instructional Drills.—Under this would come matters of general and special instruction, which do not contemplate the general idea of work ensemble. There will be drills to develop special features. A certain amount of general and rudimentary instruction should be given to all, but the major portion of instructional drill should be instruction to particular classes in special matters. This in order to impart the special knowledge for the development of special features to the fullest extent. To make an efficient use of special instructional drills, the men must be taken by classes and not in a general body; not as is sometimes done, inviting a whole division to a lecture which may be a mere repetition to the experienced members while the new arrivals are entirely unable to grasp the subject.

Accordingly, the signal force should be specially instructed in signals; the gunners' mates in the care and overhaul of battery; the quartermasters, boatswains' mates and coxwains in their special line; the seamen in theirs. The various ratings of the engineer force and other mechanics of the ship should likewise each be specially instructed in the sphere of their particular duties.

Much in the nature of instructional work can be done by the leading men and petty officers during the working periods. Instructional drills should in a great measure make use of the services of the leading men and petty officers each in their special lines. These men having acquired the practical experience and skill are specially fit to instruct and inform in practical work those who are newer to their duties.

DRILL PERIOD.

Drill periods should not be too long, and something to keep up interest should be going on all the time. The practice of

keeping men for long periods idly in ranks or standing at stations awaiting orders is tiresome and demoralizing. A quick short drill in which things are done thoroughly and with snap, and where the men are constantly and actively employed is much more beneficial than some of these long drawn out affairs where everyone is wearily longing for the sound of retreat and where interest in doing work has been lost, though in the latter a longer time is consumed.

The nature of governing conditions, the state of the weather, etc., should be considered in apportioning drills and drills under adverse circumstances or where there is an impossibility of doing things thoroughly, are not likely to be beneficial. If the conditions are such that a drill cannot be properly carried out it ought to be changed to suit conditions.

INSPECTIONS.

Inspections are of great value, but in conducting them the essential working and the points that should be arrived at in development are the matters that should have scrutiny. When inspections develop simply into scrutiny on matters of superficial appearance and smartness their value disappears.

It has in the past been often the case that the knowledge of an admiral's inspection was the signal for extra paint and bright work and the preparation of matters designed chiefly to delight the individual personal taste of the inspecting officer. The aim of the preparation in such cases has been for mere appearance at inspection and not to produce the best state of affairs for fighting efficiency. The obtaining of a good report being the result aimed at, while the real matters affecting the fighting capacity of the ship are knowingly neglected. The trouble would seem to be with the nature and manner of the inspections; these should be made with a view of determining upon the efficiency and sufficiency of the vessel in all its various directions, for the purpose for which she is designed and on the efforts and means the personnel of the ship has made and used, and the results they have accomplished.

HANDLING OF VESSELS.

The handling of the vessel should not be confined to the captain and the executive officer. All line officers should have an opportunity to acquire this skill while young and the practice

of not allowing officers to get a chance to do this important part of their profession until they have become aged and have lost their vitality is only conducive to a general inefficiency in this important matter. In the days of the sailing ship the officers of the deck had a chance to acquire it by actual test in maneuvering ships under sails and that part of their training was not neglected, but now an officer in many cases hardly ever has even a chance to give an order for changing speed or moving the helm of his own volition. That the changing of the speed of the engines or the putting over of the helm should require greater responsibility of rank than tacking or box hauling a sailing ship seems hard to understand. That these matters should be the particular province of the captain only does not seem to be founded on good reason.

Skill in this art should be acquired while young if it is ever to be thoroughly acquired. If the officers acquire this skill while yet young and full of vitality they will have the ability when older. Should the only chance to learn be as an old man it never will be learnt. It should not be asking too much to expect that every officer to command a ship or squadron should be capable of handling ships well. Not all have these abilities, some never attain them, though they may have high attainments in other lines. It would seem that the place of such is not in command, responsible for the maneuvering of ships; though there are many equally, perhaps more, important duties that they could perform with great credit to themselves and to the service. Some such positions are the technical and administrative positions. It is just as important to select for the commanders of vessels men fully capable of handling them, as it is important to select men specially fitted for conducting technical work.

When an officer, under present conditions, reaches the rank of commander it does not necessarily follow that he is thoroughly competent, as we should wish to have him, to command a ship. Officers while still young should have abundant opportunity to develop these abilities if they have them. If they are lacking, that will also soon develop, and in such cases they should be allowed to devote their attention to something toward which they have a greater natural tendency.

The handling of vessels by the captains and those succeeding them in the day of battle will have an overwhelming import.

Should there be such a condition as to have on some ships a setting up drill twice a day while no officer except the captain is ever given an opportunity to handle the vessel? Both matters are required by the regulations; why should the important, the one thing on which victory or defeat may hang, be overlooked while the mere matter of routine is held to so strictly? Is it because it is more difficult or can it be that the breadth of view is so narrow that only the sufficiency for the limits of the day are thought of?

There is a saying that every man views the earth from the limits of his own horizon. Let there be an endeavor to broaden the horizon generally.

There is greater danger in compelling a superior to do a subordinate's work than in allowing a subordinate to do a superior's. In the one case the point of view is ahead, in the other backward.

DISCIPLINE.

Discipline is an all-important desideratum of all organization and on it depends its very life and the efficient execution of its purposes.

To maintain real true discipline is an art that the great leaders of history have been the masters in; though their methods have not been alike, it will be noticed that they generally conform to the men, the conditions, purposes and the temper of the times.

Under present conditions we have the general high average of intelligence and the governing instincts of American citizens in the naval service. Better discipline will prevail where convenience, expediency, facility and efficacy are controlling factors in the issue and carrying out of orders; and will be engendered by the recognition of the need, justness and efficacy of all orders, and on the other hand the futility and perverseness of disobedience both in spirit and in word.

The regulation way should be the most convenient and effectual. Rules and regulations should be a guide and not a handicap. When they are thus their observance can be more counted upon.

Proper discipline is not to be confounded with blind literal obedience, where the end in view is often defeated, or with harshness and unnecessary restrictions. The discipline of convicts in a prison is not real discipline. It is simply a blind recognition

of the necessity of yielding to force, and receives only such obedience as the power of force can produce. Wherever this power recedes, obedience and compliance vanish. The methods of the martinet are not productive of true discipline—if anything, they are subversive to it.

Sometimes we see pointed out and cited as an example of heroic discipline, some useless sacrifice of life in the literal obedience of an order perhaps misunderstood. Such sacrifice may be heroic and is undoubted contempt for fear. When such sacrifice has been the accomplishment of a great end, as was the action of the Japanese soldiers who in blowing up the gates of Tientsin blew themselves to pieces, but allowed the allies to enter the city; or the saving of the lives of fellow men, as the man who stays by a sinking ship to avoid the overloading and foundering of the last boat; then it is truly courageous and heroic and shows a bright example of discipline. But the useless giving up of life, the courting of danger, where the doing of it has neither directly nor indirectly the accomplishment of any good or end, is more of the nature of spectacular suicide. To such influences can be attributed the over-abundance of England's dead in the campaigns of the Transvaal.

Needed sacrifice is deserving of the highest praise and may be an example of discipline and devotion to duty. But needless sacrifice is simply foolhardy and results in the setting up of a wrong standard toward which to look.

MATTERS AFFECTING DISCIPLINE.

A foundation for proper discipline is the general recognition that orders when given are intended to be obeyed and mean what they say. This is capable of being partly nullified by the way an order is issued. An order should imply just what is wanted and tell this plainly. If an order is not to be insisted upon in all respects it should be modified before it is promulgated. Often orders have the very essence of their not being complied with in the manner in which they are promulgated.

Secondly, an order is nullified by failure to obey. Such failure to comply must be immediately run down and means taken to prevent its recurrence by efficient punishment.

Nothing can be more subversive to discipline than the lax observance and carrying out of orders. Orders should be re-

quired to be obeyed fully and without question and in the spirit more than in the literal interpretation that may be placed upon them.

The giving of orders for more than is really wanted, in the hope that some part will be complied with, would appear to be rather questionable.

If a rule or regulation has become a dead letter it should be removed, not allowed to be continually violated, as such practice will engender a violation of all rules.

PETTY OFFICERS.

To ensure the prompt observance of orders the authority of petty officers must be real, unquestioned and respected, and petty officers should be backed up by all the power at hand to ensure respect and obedience. Disregard for the orders of a petty officer is a vital and most serious offense, for by the disregard for the orders of a petty officer of even the lowest rank the proper orders of the captain are nullified. On the other hand, the petty officers must be taught and trained that exceeding their authority and making it the subject of personal matters, the exercise of cruelty, needless harshness, prejudice or extreme officiousness, are things not to be tolerated. An officious search to make reports and a desire to secure punishment to as many as possible are not the signs of executive ability. The good petty officer, as well as officer, will have to make but few reports and produces obedience and observance by his real ability to handle men.

PUNISHMENTS.

Discipline will be largely affected by the manner and means in which punishment is awarded, and on the conduct of affairs at the mast depends in a large measure the general discipline of the ship.

Justice here should be impartial and uniform, adequate and equitable, neither cruel nor prejudiced. Indications of prejudice or a loss of temper, against any offender, shown by a superior officer, are extremely bad handicaps to obtaining proper respect.

Clemency, though often proper, should be impartially distributed. Severity is not good and neither is the general or repeated condoning of offences; but worse than all, an erratic, partial, prejudiced or invective meting out of punishments.

General rules regarding the punishments of ordinary offences can be drawn up and if these are adhered to, the danger of partial justice is largely eliminated; besides, the violators of the rules will know about what punishments to expect.

DISPERSING OF KNOWLEDGE.

The process of making anyone do things blindly without knowledge of the ends and purposes can never lead to best results, and though it is manifestly impossible for anyone to know all the whys and wherefores of what he is called upon to do, a wider knowledge of the reasons and principles will conduce to more intelligent and hence to better work.

The necessity for the instruction of our crews in order that they may work intelligently and awaken that interest which the knowledge of what any work is for will bring into play, is one of the apparent fields that must be exploited in the ship.

How is this general dissemination of all-around practical knowledge most easily and efficiently accomplished? Something of course will be done by the divisional officer in his instructions to the men during the drill periods, but this would be far too meager to be the chief source. Other means are necessary and must be supplied. Some ways of doing this are by means of books written in language to suit the average understanding of the men; by means of bulletin boards where important matters are published withing reach of all; by the general instruction and giving out of practical information by the petty officers and leading men of the ship during both working and recreation periods. What must be done is to excite interest in attaining knowledge and to provide easy and accessible means for supplying it. If this is done a great deal will be as it were unconsciously yet effectively attained.

Often books, pamphlets, etc., are kept on board which would be very useful in giving men general and special information but in many cases these books are not easily accessible as they should be, and the result is they are not looked at.

The general distribution of the petty officers' drill book and blue jackets' manual is a great step in the general distribution of correct information. Various other means similar to this in the different lines that our men on board ship should become well informed in must yet be supplied.

Information must be placed where the men will get it and absorb it. If it is put away and not easily gotten at it is almost useless.

The acquiring of information should progress conjointly with the acquiring of practical ability to do—each as a help to the other. Practical ability gives means for usefully applying knowledge obtained, while greater information makes this ability more keen and effective.

The school of experience and practice supplemented with constantly acquired information on the subjects dealt with is the practical education and training that will give the desired and lasting results.

PROMOTION TO DESERVING.

The desire for reward, being one of the greatest levers to move human action, deserved promotion to those who are entitled and competent gives an incentive for renewed effort and a desire to excel.

If excellence is but complacently contemplated and not adequately rewarded the great cause for extra effort is at once removed and a state of lethargy and indifference, is the likely result.

Advancement in rating should be governed by the ability to fill the positions and when they are specially able they should be certain to be advanced, whether there are vacancies or not. The chance of vacancies being made on any particular ship should not be the only route for advancement. Every man should be advanced just as far as his abilities, experience, worth and usefulness entitle him. If there are not sufficient vacancies the excess should be sent to other vessels. And then the general service would benefit from the result of men placed where they would be worth the most.

If by the selfishness of some officers certain vessels have kept on them more than their share of experienced men, competent for advancement, other vessels are caused to have inferior men. This is neither conducive to the good of the general service nor fair to the men affected.

The present dearth of men to fill the higher ratings is so great that there is a place for everyone competent to fill the positions and those who are capable should be advanced without special regard to the vacancies on board any particular ship.

Such a system carried out would make the men know that their advancement depended on their efforts to acquire the requisite ability and not on mere chance, and would give a corresponding stimulus to good work.

Art. 515 of Naval Regulations makes provisions for this but might it not be made more use of?

Extra pay or reward for extra or special abilities will bring out these abilities and gives semblance to the principle that reward depends on what is accomplished and ability to do.

CONCLUSION.

The ship in its ideal of the most efficient fighting machine with all its attending attributes is the aim of naval development. Upon it should be concentrated all the attention, all the intelligence and all the abilities present or that can be produced. Every detail that may be of possible use in action should be developed each in its highest possible manner. To have all these various means to the important end organized in a system where there is no friction but mutual aid and support; this is a field open for development to all within the service. And the creation of conditions and matters tending towards this result would seem to constitute the magnum opus of our naval activity.

Above all, naval efficiency is not, can not and never will be, gained by the development of any one thing. If any one feature be unsupported by attending matters it is but like a dead branch of a tree. Matters must be developed conjointly and simultaneously and the whole ultimate end in all its various parts must be ever in view.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

CABLE CUTTING.*

By CAPTAIN GOODRICH, U. S. Navy.

The cutting of submarine cables during war, has for its object the interruption of intelligence and is merely one of the operations incident to breaking the enemy's line of communications, the latter, a term of broad scope, although chiefly applied to the means by which an army or a fleet is kept in touch with and supplied from its base. It is evident that whatever interrupts the forwarding of stores and ammunition (the material needs of an active force), or the interchange of information and the delivery of orders (its moral needs), must of necessity deal a serious blow either through stopping the stream of provisions and munitions of war, without which an army becomes innocuous, or by intercepting the messages of information and instructions upon which depends the proper handling of the troops or the ships. According to the circumstances of the case, the latter may indeed be as pregnant with military results as the former. It was with masterly comprehension that Napoleon remarked "le secret de la guerre est dans le secret des communications," an aphorism illustrated by his own successful campaigns of Marengo, Ulm and Jena, and by his disastrous advance into Russia. In more recent days, it was the control of the lines of communication which enabled Admiral Sampson to work out his scheme of campaign with a completeness now historic.

Modern treatises on the subject, recognizing the importance of that branch of the communications which relate to the transmission of intelligence, discuss at length the duties and respon-

* See an article by the writer, on the same subject, in PROCEEDINGS OF THE NAVAL INSTITUTE, Whole No. 93.

sibilities of a director of telegraphs on the staff of the general commanding and the details of the field postal service. In the war of 1870 there was a director of military telegraphs on the staff of the commander-in-chief, whose responsibilities are briefly described by von Schellendorf in his "Duties of the General Staff" as regulating "the whole telegraph service in the theatre of war."* In our war with Spain the telegraph service was undertaken by the army signal corps with but indifferent success. Its attempts to interrupt the enemy's cable communications failed utterly, but that is another story which you may hear later. Says Col. Furse, C. B.: "Notwithstanding these disturbances, no commander in our days would think of taking the field without the aid of the electric telegraph. Who can fail to appreciate the immense advantage it is to him to possess an exact knowledge of all that is passing in the scattered parts of his army? Consider the benefit of his being able to place himself in direct communication and interchange views with his subordinates; with what confidence he can give directions, impart the result of the operations of lateral columns, indicate the assistance to be expected from them, and the time likely to elapse before this aid may reach its destination. Look how the operations of two or more armies, separated by some impassable natural barrier, have ceased to be such a risky thing as they have hitherto been; for, thanks to the electric telegraph, their commanders can now combine their movements and can be in constant intercourse." This picture of the strategic conditions of warfare on shore is a but a tiny miniature when compared with the vast canvas required to depict the operations of fleets and squadrons. The distances in the one case are measured by single miles, in the other by hundreds of leagues. No wonder our late commander-in-chief determined to gather into his own hands the nerve threads which brought into touch his widely-scattered squadrons and to sever those which kept Cervera constantly informed as to his enemy's movements. No less essential it seemed to Sampson to hold the one than to destroy the other. It was not necessary to teach him, in the words of the author already quoted, that

* Said Major-General Webber, R. E., twenty years ago, "When the army learns to apply the telegraph as extensively to a line of communications as it is used by railway companies, commensurate results will be produced in war."

"The destruction of telegraphic communication between the enemy's forces and their base, and with the provinces on either flank, is a great object in war." It was the submarine cable which told Cervera of the attack on San Juan, Porto Rico, and thus turned him away from the destination to which he had been ordered and which Sampson had rightly guessed. Had the lines leading to Porto Rico been promptly cut at the outbreak of hostilities, Cervera would have met, off San Juan, the fate which befell him on the 3d of July, and the war would have been over before it had fairly begun.

It follows from these preliminary considerations that accurate information as to the location of all submarine telegraph lines should be at the disposal of our commander-in-chief that he may know where it will be most advisable to send a vessel to cut such lines as lead to the enemy's territory. This is no new suggestion. Although our experience during the war with Spain demonstrated its value, the suggestion itself had been previously made in one of the most important papers ever read before the Royal United Service Institution of Great Britain. Pointing out in 1881 the pressing necessity of establishing an Intelligence Office at the Admiralty, Sir John Colomb mentioned, among other duties, "It is also of importance that all particulars concerning the exact position, nature of bottom, and depth of water in which submarine cables are laid should be collected and furnished to naval commanders, so that they may know where to cut or tap them, or prevent others from doing so."

I am unable, through ignorance, to state that our own excellent Office of Naval Intelligence is in a position to supply this information with that exactness which Sir John had in contemplation when he wrote the words just quoted, and I am disposed to believe that the difficulty of obtaining this knowledge is so great as to be for us practically insuperable, since substantially all submarine cables, the world over, are owned by foreign corporations and controlled by foreign governments. It is not likely that these corporations would reveal the location of their various lines so frankly and so fully as to facilitate their destruction in time of war. While not pretending to assert that the precise information which would have been so valuable to us in 1898 was not in the possession of our Office of Naval Intelligence, yet I may say that it did not reach either of the parties that undertook to cut the lines leading to Cuba.

The lack of definite knowledge of the locations of cables does not, however, operate as a hopeless bar to their raiding. The terminal points are known to every one who cares to consult the diagrams of cable connections which are freely open to the public, and which are printed by our own Hydrographic Office. If therefore you are directed to isolate any place or territory telegraphically you will easily learn the points where the cables land, and where they originate.

To trace the intermediate route is not very difficult, if you keep in mind one factor of determining importance. Of course you will, in this way, only get an approximate, or probable, location, but you will not be very far from the truth. This factor is cost. Each deep-water cable is worth about one hundred pounds sterling a sea mile, and each knot saved means less capitalization and greater economy in laying and maintaining. You may be pretty sure therefore that the wire you seek has been run in a straight line, or as nearly in a straight line as topography and hydrography permit. Along a convex coast line it is to be sought not far from the beach, and preferably in not less than 30 fathoms.* Along a shore-line consisting of capes and bights it shaves the points. In no case is wire unnecessarily paid out, and this hint will give you the clue you require. You may with confidence lay down on your chart the probable course of the cable from start to finish and then take up the next question in order—where is the best place to attempt the grappling? Military considerations may confine your movements to a narrow zone. In this case you have no choice and you must do the best you can under the circumstances. If, on the contrary, you are free to go where you please, you will study the chart with care and select a point where the water is shallow and the bottom free from rocks. In deep water, much time is consumed in making a "drive," as the trip across the line of the cable is called, and the difficulties attending the hooking on and heaving up are greatly increased. On rocky bottom the cable lurks among boulders; a grapnel is apt to pass over it without hooking, or to be caught on a stone and its prongs straightened out like an umbrella turned inside out by a sudden gust of wind. "I may remark that the two cables from Santiago to Cienfuegos come under the head of cables protected by the

* In shoal water the surface agitation is transmitted to the bottom, where it chafes and injures the lightly-armored deep-sea cable.

nature of the bottom. We made in the *St. Louis* and *Suwanee* no less than fourteen drives for them at points varying from just outside the harbor mouth at Santiago to ten miles distant, but we never succeeded in getting the wire or in bringing up anything more than the grapnel itself with its prongs straightened out. The Santiago-Cienfuegos cables were our conspicuous failure." Should the bottom be shelving the drive is made up hill, or from deep water into shoaler water. It is hardly necessary to add that the direction is square across the lie of the cable.

You have now determined upon the place where your search is to begin and upon the general line to follow. Let us consider briefly the mechanical means to the end we have in view.

The appliances needed by a ship assigned to the duty of cutting cables are few in number and simple in nature. They consist essentially in a suitable instrument for grappling the cable, a stout and flexible line attached to the foregoing and a steam windlass or capstan for heaving in. It will be apparent on reflection that the first is more likely to be a special tool than the others and one which, in its higher development, is not likely to be found in the naval service. A sounding machine capable of reaching bottom at a thousand fathoms or more may be very helpful but it is by no means indispensable. If you cannot get a cast with the lines you have, you must do as I did off Santiago, use the grappling hawser itself for a lead line. Other things being equal, the best results in all mechanical operations are achieved with apparatus designed solely for the particular task in hand, and containing in its plan and workmanship the highest skill, deepest thought, and widest experience of the expert. The job can be, and often is, done with inferior facilities, but time, labor and patience must be expended to replace the unerring precision and rapid output of the special machine. A few words devoted to study of the most successful forms of grapnels will not be amiss, for the latter will convey hints as to improvising, which may prove of great value. If we pause to reflect upon the way in which a cable rests upon the bed of the ocean, we shall realize that the conditions may so vary from place to place as to present a wide diversity of problems to solve, the variable being for the same cable, the changing character of the bottom. The cable may hang in a long bight from crest to crest of a valley; it may lie on a generally level floor yet nestling among boulders and rocks so closely as to be almost

secure against grappling; it may rest easily on a hard bottom; it may have sunk deep into mud and ooze. Plainly what will pick it up in one case will fail to dig it out in another; what will dig it out here will not get within its stony guard there. And so we find that the nature of the bottom has forced the clever men charged with the maintenance and repair of submarine cables to devise grapnels appropriate to the particular needs in each instance. Fortunately we may, in a rough telegraphic fashion, divide ocean bottoms into three classes, soft, hard and rocky. If we know, in a general way, what tools have been invented for use on these three classes of floor, we shall be helped in our improvising when it falls to our lot to drag for a submarine cable.

The exemplar and forebear of them all is the grapnel known to sailors from the earliest ages. When it was found that the ordinary grapnel was too light, the weight was increased up to 500 pounds as a maximum; 200 pounds may be accepted as a good working figure. It was soon seen that the short shank and the long prongs made a grapnel jerk and jump on hard bottom, so for this latter use the prong was shortened to a scant hook and the shank lengthened. Neither of these forms being satisfactory among rocks, it occurred to some nameless expert to use a heavy bar of iron or steel about 4 feet long provided with numerous short hooks distributed along its four sides, trusting to its shortness and its weight to search out the interstices between boulders and thus seize the cable in its hidden lair. Such was the origin of the fitly named centipede, the third of the types of grapnels employed by cable ships. I have mentioned them so far in their simplest form, but it is not to be supposed that so highly organized and costly a service should not have evolved modifications to meet certain difficulties which arose from time to time. Thus you may readily imagine a grapnel to have picked up a cable and, before being lifted clear, to have caught its prong in a rock. The simple type would have opened out the prong and have lost the wire. Here ingenuity entered and suggested either a spring which would hold the prong extended except in the event of too great a strain, on a prong held in position by a soft pin. In the first instance, the spring returns the prong to its place when the strain is eased up; in the second, the pin of lead or soft iron is sheered, the prong swings open on its hinge, but in both cases the cable is still held by the shoulders of the lugs between which

the prong revolves, or by projection on the shank itself. With the simple grapnel this same end is secured, sometimes, by a spring which holds the cable even if the toe straightens out. Another improvement is sought in a means by which a cable, after being grappled, may be cut, one end dropped and the other firmly held, brought to the surface. Should any of my hearers care to dip deeper into this subject they may consult Prof. Jameson's paper on "Cable Grappling and Lifting" in the *Journal of the Society of Telegraph Engineers*, Vol. II; the *Electrical Review*, for January 11, 1895; Mr. Frank Lambert's paper read in 1876 before the Society of Telegraph Engineers on "Grapnels for Raising Submarine Cables in Deep water"; Mr. Chas. Bright on Submarine Cable Grapnels, *Engineering*, November 4, 1897, etc. The illustrations to which I shall now refer may be found in the latter article. Fig. 1 is the short-toed grapnel for use on hard bottom, such as sand and gravel; Fig. 2, the long-shanked, long-toed grapnel, for use on soft bottom, such as mud and ooze; Fig. 3, the conventional form of centipede.

In a centipede ordered for the *St. Louis*, but never used on account of the speedy collapse of the Spanish resistance, a five-inch iron pipe was substituted for the bar. Holes were drilled through it from side to side, square bars of ¾-inch steel about 15 inches long were forced through these holes, the ends bent in the same directions, and the metal upset to hold the claws firmly in place.

I have thought it well to exhibit a grapnel of special make to illustrate one successful manner in which the problem had been solved. Fig. 4 shows two Stallibrass grapnels coupled together for centipede work, and Fig. 5, the details of the grapnel itself. The toes are pivoted about the bolt A, their heels resting against the soft iron pin B. When the strain is too great the latter shears and the toe drops into the dotted position, freeing the grapnel from the rock or other obstruction, but the cable remains caught and firmly held in the round seat shown in the figure. A capsized toe tends to throw the grapnel over and a sound toe down, something which invariably does *not* happen with the ordinary grapnel. It is stated on authority, that so long as one toe is in its normal position, the Stallibrass grapnel may be relied upon.

I will not waste your time over the so-called "Cutting and holding Grapnel." If you should need one it will be better to

buy the tool, of which, it may be remarked, numerous varieties are in use.

It is always well to place a length, say 15 fathoms, of half-inch chain ahead of the grapnel. The object is two-fold, first, to weight the ring of the grapnel and thus hold it down to its work; second, to avoid chafing the line. It may also be seen that such a chain will fall into the spaces between rocks and so guide the grapnel to its object. As there can never be any disadvantage in using the chain, and as it is frequently of great utility, I suggest its employment as an invariable rule.

The line or hawser may be anything stout enough for its purpose. Practically you will be doubtless thrown back on what is available. The depth of water will suggest an appropriate size. But a heavy "shore end" may demand in grappling as strong a hawser line as a lighter cable laid in deep water. I have personally used manila hawsers from 5 to 8 inches in circumference, but, for the reason that no others were to be had.

The operation of grappling is directed by one officer who keeps his hand on the hawser and from the vibrations which it transmits from the grapnel hundreds of fathoms below, he forms an idea of what is going on at the bottom, which is correct in direct proportion to his experience. Little shocks, like a succession of tremors, tell him that the grapnel is slipping along a reasonably smooth floor; a heavy strain followed by a sudden release, that it has fallen among rocks; a gradual increase of tension always accompanies, although it is not the invariable proof of, the hooking of the cable. From these facts it will become evident that the lighter and more flexible the grappling line, the more truly and delicately will it transmit the vibrations originating at the bottom, and the more accurately may these vibrations be interpreted. Use therefore the lightest line of sufficient strength. Here again, special wants have brought about special means, and the grappling line is now as much an article of manufacture as the submarine cable itself. Strength is secured by the adoption of steel wire (galvanized to prevent corrosion), and flexibility is gotten by using many fine wires, laid up into seven strands, each strand wrapped in tarred hemp. Get this if you can, but remember that it is a convenience only, not a necessity.

The cable ship inserts a dynamometer before the winding-in machine to obviate heavy surges. The same end may be reached

in a cruder and less effective manner by a steam winch with a variable throttle in the hands of a skilful person who acts in obedience to signals from the officer in charge.

A cable may be hove up by a windlass or capstan out of sight of the grappling officer, but the chances of breaking the wires are thereby enormously increased. If your forecastle winch is too small in the heads, for rapid work, it may be necessary to enlarge the latter by wooden chocks or whelps—but avoid the mistake of making them so large that the winch power becomes inadequate.

While the smaller ship is handier, there is no real limit to the size of the vessel which may be used for this purpose. My own experience was had in the *Suwanee,* in the *Wompatuck* of 460 tons displacement, and the *St. Louis,* displacing 17,500 tons, the largest vessel, by the way, which ever flew a pennant.

On arriving at the spot chosen for cutting a cable, the first thing to do is to stop the ship dead in the water and ascertain the depth, unless this is given by the chart. It is possible that you may not have enough sounding wire to reach the bottom. This, I have said, was my case off Santiago. There is then nothing left but to lower the grapnel over the *bows* and bend on hawser after hawser until the grapnel strikes the bottom. You will have taken such a position as will enable you to drag up hill and you will begin the drive far enough on one side of the known or assumed line to be certain that the wire lies ahead of you. The dragging is always done over the bows, as that is the one end of the ship which may be controlled. The grapnel is on the weather side to keep the line clear of the screw. The more slowly the ship moves the more likely is the grapnel to seize the cable. Her advance should be so gradual as to be hardly perceptible. The best way of measuring her speed is by means of a "Dutchman's log," small billets of wood thrown upon the surface of the water from time to time. "The grapnel creeps over the bottom, its prongs burrowing slightly under the surface of the soil until they catch underneath the cable. The gradually increasing tension on the grappling rope reveals to the expert, whose hand is always on the outboard part, that the cable is caught * * * * . It is well to keep going ahead for a few minutes after getting an unmistakable bite in order to lift the cable off the bottom, and thus ensure its being hooked. Then the ship is stopped and the

line, taken to a steam winch or capstan is hove in. As soon as the bight is well out of water, a hawser is bent to it and the grapnel relieved of its duty. When the cable is inboard, a stout plank to protect the deck, a couple of sharp blows with an axe and the thing is done. Letting go one end and steaming a couple of miles away with the other will make a gap of sufficient magnitude to embarrass the repair steamer, should she come along before peace is declared."

In 1898, cable cutting led to certain very exciting episodes, and to one affair which may be fitly mentioned in the same breath with Cushing's attack on the Albemarle. I allude to Winslow's and Anderson's gallant work at Cienfuegos, described at length in the *Century Magazine* for March, 1899. If any one should take sufficient interest in my own experience on May 18, 1898, when for eight hours the *St. Louis* and *Wompatuck* lay within easy range of the batteries at Santiago with which for three-quarters of an hour they were in hot action, he will find the official report in the well-known appendix (Bureau of Navigation's) of 1898, and a brief popular reference in the PROC. NAV. INST. No. 93, p. 163

In conjunction with the *St. Louis'* usually successful efforts, I cannot refrain from recalling an occurrence which many of you doubtless witnessed early in June off Santiago. "About this time the Army Signal Corps was vainly endeavoring to get the remaining Santiago-Jamaica cable, the one which it seems the *St. Louis* had left intact on May 18, although I had reason at the time to believe it broken. The Corps had chartered the cable steamer *Adria*, fully equipped for such work, while I had furnished all the information in my possession, how and where I had grappled number one, and what measures I should adopt to secure number two. As far as I could, I aided in every way. Among other things I advised steaming across the line of the cable from east to west, for I had towed the broken ends of number one to the westward, leaving the eastern approach clear. Any cable picked up to the eastward would, therefore, in all probability be a live cable.

"Provided thus with all the counsel and knowledge at my disposal, the cable steamer under the Signal Corps, made one last and dramatic effort, passing over the line with the *Oregon* and *Texas* between her and the batteries. To make a long story

short, she went from west to east, and she did not get the cable then or at any other time."

"On the night of June 18, the admiral allowed the *St. Louis* to try for the remaining cable. Starting in after nightfall and proceeding from east to west she picked up and severed the cable without difficulty or loss of time."

I think there can be no reasonable objection to our including a properly equipped cable ship among the indispensable auxiliaries to a fleet or to our insisting that she should be of the navy, under naval control absolutely—and not like the *Adria*, for example, a chartered foreign steamer under the control of a staff officer of the War Department in Washington. Captain Squier, U. S. A., is quite right when he claims that "it may be said at present that no modern fleet is complete without a cable ship especially designed for cable operations in time of war."

I cannot leave the subject of cable cutting without making the suggestion that the other side of the medal ought to receive attention from the naval authorities in general and the General Staff in particular, in order that some provision or arrangement may be made in time of peace for the laying of such cables as are thought or found desirable in putting the plan of campaign into actual operation. Only half our work is done when we interrupt the enemy's communications—we must keep our own intact, and we must supply such missing links or such ramifications of the existing network of commercial cables as will serve to maintain our commander-in-chief in touch with the outside world, should he so desire. If he prefers, like Dewey, at Manila, to drop a veil behind him, cut himself from his base and work along his own path unhampered by instructions from Washington, that is assuredly the prerogative of his high office. On the other hand, if he thinks it wise to follow the example of modern generals with their field telegraph companies and organization, then he should have at his command, vessels for laying submarine cables either of the special design in universal employment by the great corporations, or improvised craft fitted in a rough manner with suitable instruments and provided with sufficient wire stout enough to stand the unavoidable strains, and yet slight enough to occupy small space in the hold. Obviously, a wire for temporary use may, properly, vary in many respects from the established pattern evolved for permanent use on well-known routes.

Such a cable would naturally, be so run out as to escape ready detection by the enemy and its starting point would call for adequate defence. It seems to me that the utmost simplicity is *sine qua non* in all parts of this temporary installation.

Thus, from the desirability of severing our enemy's lines and of maintaining our own communications, the double need arises for the cable ship alluded to above. I think you will all agree with me that she will come when the clouds of war next gather on our horizon and that when she comes she will come to stay.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

CITIZENSHIP AND THE PROTECTION OF NATURALIZED CITIZENS ABROAD.

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When the normal relations between nations were those of belligerency, the principle underlying those relations was the predominance of might and self-interest. As this attitude changed and gradually developed with the advance of civilization into the desire on the part of nations to maintain peace with one another, so did the relations change from normal belligerency to normal amity and friendship. In the earlier stages of this development the foreigner had no rights, he was regarded as a slave; his property on the slightest pretext was plundered or confiscated;* piracy was an important and legitimate branch of international commerce, the dangers of which could be avoided by paying in advance the stipulated and often regulated tribute, which tribute, or tariff, was regarded very much in the light of marine insurance.

If we will bear in mind that the development to which we have referred has by no means reached its final stages, but that distinct signs of arrested growth in varying degrees are not only traceable, but clearly evident in many of the principles as expounded by the leading authorities on international law, we will be better able to harmonize as well as distinguish between abstract principles as laid down by the text writers and specific cases as adjusted by diplomatic negotiations. This development also marks the stages of evolution of international relations from

*Walker's Science of International Law, pp. 214-217.

a policy based upon predominant might and self-interest, to the recognition of reciprocal obligations based upon equal sovereignty and the principles of justice as between civilized nations. As the individuals composing a nation became more enlightened and imbued with a sense of right and justice, so the nations which ultimately reflect public opinion, shaped their political and executive relations towards each other by their laws, treaties and conventions, so as to avoid international differences and lessen those double-edged controversies, which arose out of the conflict of sovereignty and were the fruitful causes of war.

Among the questions coming under this head, none are of more frequent occurrence than those growing out of the conflicting claims of sovereignty and allegiance made by nations respecting their subjects.* The chief conflict arises out of the following classes of cases:

(a) Where a person is domiciled in a country wherein he was born, descended from a father born in the dominion of another country.

(b) Where a person born in one country, emigrates therefrom and becomes naturalized in the country of his adoption, and afterwards returns to the country of his birth.

The evolution and revolutions which brought about the overthrow of Feudalism as a State system have not entirely obliterated many of the precedents that system engendered. It has left in European countries as a prerogative of early monarchical claims the idea of perpetual allegiance transferred from the liege lord to the State, except in so far as these ideas had to yield to the conflicting claims of sovereignty, which are chiefly embodied in the reciprocal clauses of naturalization treaties. The feudal doctrines have never found root in this country. "The Government of the United States commenced with successful revolution; it was organized on the hypothesis of allowing the largest range to individual volition compatible with public safety; the people of the United States are composed of emigrants from

* Subject and citizen are, in a degree, convertible terms as applied to natives, and though the term *citizen* seems to be appropriate to republican freemen, yet we are, equally with the inhabitants of all other countries, subjects, for we are equally bound by allegiance and subjection to the government and law of the land."—*2 Kent's Commentaries* (6th ed.), 258, note.

Europe, most of whom expatraited themselves in order to escape from oppression, or, if you please, legal impediments to personal action, in the countries of their birth—and many of whom were the actors and the victims of revolutions or of civil wars. . . . The doctrine of absolute and perpetual allegiance—the root of the denial of any right of emigration—is inadmissible in the United States. It was a matter involved in and settled for us by the Revolution which founded the American Union."*

It has been claimed even by some of our leading jurists of former years, that as we adopted the common law of England, as it existed at the time of our separation, therefore we adopted the common law doctrine of indissoluble allegiance. "But there are two sufficient answers to this course of reasoning; the common law of England is not the international law of the world, and we have inherited and adopted the common law of England only in so far as its provisions and its reasoning are adapted to our new situation and our political institutions. Therefore the common law doctrine of indestructible allegiance is not a part of the system of American law any more than it is of the international law."†

The United States have led the way in the overthrow of the feudal doctrine of perpetual allegiance. The executive branch of the Government has from the earliest times consistently upheld the right of expatriation, and opposed the doctrine of indissoluble allegiance. In 1793, Mr. Jefferson, then Secretary of State, in a letter to Mr. Morris, says: "Our citizens are certainly free to divest themselves of that character by emigrating, and other acts manifesting their intention, and may then become the sub-

*Foreign Relations, 1873, Part 2, 1353-1365. Opinion of Caleb Cushing, Attorney-General.

†Report of Geo. H. Yeaman, United States Minister to Denmark. Diplomatic Correspondence, 1867, Part 1, 674.

"Obviously, when the Constitution deals with common law phraseology, the language should be read in the light of the common law; but when the question arises as to what constitutes citizenship of the nation, involving as it does international relations, and political as distinguished from civil status, international principles must be considered, and unless the municipal law of England appears to have been affirmatively accepted, it cannot be allowed to control in the matter of construction. Nationality is essentially a political idea, and belongs to the sphere of public law."—U. S. *v.* Wong Kim Ark, U. S. Rep., Vol. 169, p. 707 (1898).

jects of another power, and free to do whatever the subjects of that power may do." Again, in 1794, Mr. Randolph, Secretary of State, relative to the alleged expatriation of one, Captain Talbot, said: "I can not doubt that Captain Talbot has taken an oath to the French Republic, and at the same time I acknowledge my belief that no law of any of the States prohibits expatriation."

The United States have never passed any law restraining their own citizens, native or naturalized, from leaving the country and forming political relations elsewhere.* Besides, the naturalization laws of the United States are inconsistent with this doctrine, as they require an alien who is to be naturalized, to abjure his former allegiance without taking cognizance whether his sovereign of origin has released him.

I have appended a statutory history of naturalization in the United States beginning with 1790, specially prepared by Mr. Gaillard Hunt of the Department of State. It will be seen that while in all of these laws the right of expatriation is implied that implication was recognized by express enactment by the Act of 1868, whose preamble reads: "Whereas the right of expatriation is a natural and inherent right of all people, indispensable to the enjoyment of the rights of life, liberty, and the pursuit of happiness, and whereas in the recognition of this principle this Government has freely received emigrants from all nations, and invested them with the rights of citizenship," &c.†

Our foreign relations are replete with cases wherein we have consistently urged and generally upheld the doctrine of the inherent right of expatriation.

The insistence upon this right brought us into war with England in 1812, and again in 1848 came near bringing us into hostile collision with Austria, arising out of the case of Martin Koszta. In the Koszta case by reason of the peculiar circumstances and the summary manner, Martin Koszta was seized or rather kidnapped by the Austrian authorities in neutral territory, provoked, if it did not entirely justify the extreme claim of protection by the United States. The case is commented upon in all the text books. Martin Koszta was a Hungarian insurgent of 1848-9. He escaped to Turkey, and from there went to the

* Webster, Secretary of State, to Mr. Thompson, July 8, 1842. Wharton's International Law Digest, Vol. II, 310.

† See Appendix.

United States, and in 1852 made to the usual declaration preparatory to being naturalized under our laws. In 1854 he returned to Turkey. At Smyrna he was, by the order of the Austrian Consul, seized while on shore and thrown into the water, taken up by the crew of the Hussar, an Austrian frigate, and put into irons. Before the boat got under way an American frigate arrived and threatened to sink the Austrian vessel unless Koszta was released. This led to an arrangement by which he was put under the custody of the French Consul-General, until the governments should come to an understanding. The Turkish authorities had refused to allow his arrest, and Austria, it seems, subsequently claimed she had a right to do so under the capitulations. I have examined these capitulations, but do not find a basis for such claim. I advert to this point, which I find referred to in the correspondence, but not by the text writers in their discussion of the case. This fact doubtless influenced Mr. Marcy, the Secretary of State, to expand the doctrine of protection so as to include inchoate citizenship under such exceptional circumstances. Besides, as Secretary Marcy correctly emphasized, Koszta had been banished by Austria, and banishment under the law of nations, operates a release of allegiance. So in any event Austria was estopped by her own act. That this is a fact, is borne out by the action of Secretary Marcy in the case of Simon Tousig, who had also filed his declaration to become an American citizen. On returning to Austria, Tousig was arrested for the same cause, participation in the Hungarian Insurrection. Mr. Marcy refused to interfere, and stated: "Every nation, whenever the laws are violated by any owing obedience to them, whether he be a citizen or a stranger, has a right to inflict the penalties incurred upon the transgressor if found within its jurisdiction."

England, while freely allowing liberty of emigration, held to the principle of indelible allegiance until 1870. Her former attitude was neither logical nor consistent, in that she did not follow her emigrants to other countries with English protection, but claimed the right of their allegiance whenever she chose to demand it. So long as they remained in a foreign country they were held to their foreign claim of allegiance, and estopped from asking British protection, yet when they returned to England the claim of their foreign allegiance was not admitted. No more

striking illustration of conflict of sovereignty arising out of opposing doctrines maintained by two nations on the question of expatriation than the causes that brought on the Anglo-American war of 1812. So long as these opposing doctrines were insisted upon all efforts to arrive at a peaceful arrangement proved futile.* In 1807 the King issued a proclamation containing the following passage, "Now we do hereby warn all such mariners, seafaring men, and others, our natural-born subjects, that no such letters of naturalization, or certificates of citizenship do, or can, in any manner divest our natural-born subjects of the allegiance, or in any degree alter the duty which they owe to us, their lawful sovereign."

In 1809 Mr. Smith, the American Secretary of State, in a dispatch to Mr. Pinkney, our Minister to the Court of St. James, announcing the refusal of the President to accord further official intercourse with Mr. Jackson, the British representative, whose negotiations his government had disavowed, states: "What possible consideration could have induced the British Government to expect that the United States would admit a principle that would deprive our naturalized citizens of the legal privileges which they hold in common with their native born fellow-citizens."

Englishmen naturalized in the United States were impressed from on board American vessels for service in the English Navy. President Monroe in his inaugural address on March 4, 1823, refers to this attitude of England, he said: "They have refused to consider as prisoners of war, and threaten to punish as traitors and deserters, persons emigrating without restraint to the United States, incorporated by naturalization into our political family, and fighting under the authority of their adopted country in open and honorable war, for the maintenance of its rights and safety. Such is the avowed purpose of a Government which is in the practice of naturalizing by thousands citizens of other countries, and not only of permitting but compelling them to fight its battles against their native country."

Mr. Monroe, when Secretary of State, in the instructions to the American Commissioners for negotiating the Treaty of Ghent

* These negotiations are detailed in the Appendix to the Report of the British Royal Commissioners on the Laws of Naturalization and Allegiance (1869).

(April 15, 1814), says: "It is contended by some . . . by naturalizing a foreigner, no State can absolve him from the obligation which he owes to his former Government, and that he becomes a citizen in a qualified sense only. This doctrine, if true in any case, is less applicable to the United States than to any other Power. Expatriation seems to be a natural right, and by the original character of our institutions, founded by compact on principle, and particularly by the unqualified investment of the adopted citizen with the full rights of the native, all that the United States could do to place him on the same footing has been done."

I cite these opinions out of many of a like nature as showing the divergent positions taken by England and the United States upon this subject. The Prince Regent in the Proclamation issued on the 24th of July, 1814, recalling and prohibiting natural born subjects of His Majesty from serving in the ships and armies of the United States, entirely disregarded American naturalization and gave notice to those who remain in the service that they would be treated as guilty of high treason. Of course, this extreme position was due to the existence of war between the two countries, and was regarded as a war measure.

In the negotiations which terminated in the treaty of Ghent, the Commissioners did their utmost to incorporate the claims of the respective governments as to expatriation and perpetual allegiance; but it was found the divergent positions under their instructions, could not be harmonized, so that question was dropped, the United States Commissioners stating: "The causes of war between the United States and Great Britain having disappeared by the maritime pacification of Europe, the Government of the United States did not desire to continue it in defense of abstract principles, which have, for the present, ceased to have any practical effect." * Yet on examination of this treaty it will be seen that Article III provides for the restoration of all prisoners of war. This was by implication an abandonment of the extreme position taken by Great Britain, and to that extent a recognition of the American doctrine of expatriation. With the abandonment by Great Britain of impressment as a means of manning the navy the sources of possible collision upon this

*Royal Commissioners' Report, p. 37.

question were removed. From time to time the United States made advances to open negotiations with Great Britain upon the subject of expatriation, but successive English Governments, though having abandoned in practice the claim of perpetual allegiance, refused to come to a definite understanding on the question. In 1842 Lord Ashburton was sent on a special mission to the United States authorized to negotiate for the settlement of all existing differences between the two countries. Mr. Webster, availing of this opportunity, addressed a note to him for the purpose of coming to an arrangement upon these questions, setting out the efforts that had been made by the United States in that direction for the past fifty years. Lord Ashburton, however, put the negotiations aside, stating his instructions limited him only to existing subjects of difference, said: "I am well aware that the laws of our two countries maintain opposite principles respecting allegiance to the Sovereign. America receiving every year by thousands the emigrants of Europe, maintains the doctrines suitable to her condition, of the right of transferring allegiance at will. The laws of Great Britain have at all times maintained the opposite doctrine."

Diplomatic conflicts with England and other countries arising out of this question of allegiance and expatriation continually presented themselves. In 1848, during the Irish disturbances of that year, Bergen, a native American, and Ryan, an Irishman, naturalized in America, were arrested on suspicion of treason. Mr. Bancroft, our Minister to England, remonstrated against the treatment of the arrested persons as subjects of Great Britain. Lord Palmerston in his answer upheld the traditional law of perpetual allegiance. Mr. Buchanan, Secretary of State, instructed Mr. Bancroft: "Whenever the occasion may require it, you will resist the British doctrine of perpetual allegiance, and maintain the American principle, that British native born subjects after they have been naturalized under our laws, are to all intents and purposes as much American citizens and entitled to the same degree of protection, as though they had been born in the United States." While these conflicting views were expressed it resulted in the liberation of Bergen and Ryan on condition of their leaving the kingdom.*

* Royal Commissioners' Report, p. 40.

In 1859 Mr. Cass, Secretary of State, in his instructions to Mr. Wright, our Minister to Prussia, respecting the protection of our naturalized citizen of Prussian origin, who on their return were arrested under the regulations for enlistment, and laws against expatriation, said: "The moment a foreigner becomes naturalized, his allegiance to his native country becomes severed forever. He experiences a new political birth. A broad and impassable line separates him from his native country. He is no more responsible for anything he may say or do, or omit to say or do, after assuming his new character, than if he had been born in the United States. Should he return to his native country he returns as an American citizen, and in no other character. In order to entitle his original government to punish him for an offence, this must have been committed while he was a subject and owed allegiance to that government. * * * * A future liability to serve in the army will not be sufficient because before that time can arrive for such service he has changed his allegiance and became a citizen of the United States." He then distinguishes between these cases and those where the person had been drafted or had actually deserted prior to emigration.*

Another important case that came up at this time was that of Christian Ernst. He was a native of Hanover, and emigrated to this country in 1851, when he was about 19 years of age. In February, 1859, he was naturalized, and in March, after procuring a passport, he went back to Hanover on a temporary visit. He had been in the village where he was born about three weeks, when he was arrested, carried to the nearest military station and forced into the Hanoverian Army. Upon this state of facts Mr. Caleb Cushing, the Attorney-General, said: "I know that the common law of England denies it (the right of expatriation); that the judicial decisions of that country are opposed to it; and that some of our courts, misled by British authority, have expressed, though not very decisively, the same opinion. But all this is very far from settling the question. The municipal code of England is not one of the sources from which we derive our knowledge of international law. We take it from natural reason and from the practice of civilized nations. All these are opposed to the doctrine of perpetual allegiance. It is too injurious to the

*U. S. Senate Documents, 1858-60, Vol. II, 1364. Report on Expatriation and Naturalization, Foreign Relations, 1873, II, 1295.

general interests of mankind to be tolerated; justice denies that men should either be confined to their native soil or driven away from it against their will. Expatriation includes not only emigration out of one's native country, but *naturalization* in the country adopted as a future residence." *

The next class of cases which brought this question to the foreground in our diplomacy were those arising out of the Fenian arrests, and the suspension of the Habeas Corpus Act in Ireland in 1866.† These cases (the Fenian) and those with Prussia gave rise to political agitation which stimulated Congress to place our policy regarding the protection of our naturalized citizens in foreign countries and our doctrine regarding the right of expatriation into a definite enactment, so that there might no longer be doubt as to our position or any question respecting a conflict between the decisions of the courts and the executive branch of the government. This act of Congress of the 27th of July, 1868, the preamble of which I have quoted, declared the principles upon which the naturalization laws of the United States always rested, and gave legislative sanction to the doctrine uniformly held by the executive and political branches of the Government. It enacted: (Sec. 2) "That all naturalized citizens of the United States, while in foreign states, shall be entitled to, and shall receive from this government the same protection of persons and property that is accorded to native born citizens in like situations and circumstances."

The foreign relations in all countries to a greater or less extent are shaped by internal conditions, and doubtless this law which was enacted to win over foreign born citizens to the support of the party in power, while entirely applicable for the protection of this class of citizens within the jurisdiction of the United States, has in many instances been found impracticable or impossible to enforce, where such foreign born citizen has returned to the country of his birth. These latter cases have caused endless vexatious negotiations, at times imperiling the good relations of our country with other nations.

The fact is, the same year this Act was passed we concluded the first of our series of naturalization treaties, wherein we limited, except under exceptional circumstances, the period of protection

* Ibid., Foreign Relations, 1873 II, 1203.
† Foreign Relations, 1866.

of naturalized citizens to two years after their return to, and residence in the country of their origin. And yet the United States goes further in the protection of its naturalized citizens, even under these circumstances than any other country. Great Britain, for instance, while freely according naturalization, has relieved herself from protecting its foreign born subjects on their return to the country of their origin.*

We have treaties of naturalization with the following countries: Austria-Hungary, Baden, Bavaria, Belgium, Denmark, Ecuador, Great Britain, Hesse-Darmstadt, the North German Union, Sweden, Norway, and Wurtemberg. These treaties have had a restraining as well as eliminating effect, restraining such who otherwise would seek our naturalization with the purpose of returning to the country of their origin and their claiming the protection of our laws; and an eliminating effect, in relieving our country with certain exceptions, from protection of naturalized citizens on their return to their country of origin after a residence therein of two years or more.

The Act of 1868, in reference to such countries with which we have treaties of naturalization, is modified by the two-year clause of such treaties, but with such countries as Turkey, Russia, France, Mexico, and the other Republics of this hemisphere, with which we have as yet no treaty of naturalization, continual conflicts arise, which are aggravated in times of revolution or other domestic disturbances in such countries, by the return of their former subjects clothed with American naturalization. A large part of the time of our State Department and our diplomatic agents is taken up with this class of cases, which often menace our friendly relations.

My purpose in presenting this subject aside from the importance of the questions involved, is to direct attention to the advisability, if not the imperative duty of our law-makers, to modify our laws regarding naturalization in respect to that special class of our naturalized citizens who are a constant menace to our

*The Naturalization Act, 1870, paragraph 7, subdivision 3: "An alien to whom a certificate of naturalization is granted . . . shall not, when within the limits of the foreign State of which he was a subject previously to obtaining his certificate of naturalization, be deemed to be a British subject unless he has ceased to be a subject of that State in pursuance of the laws thereof, or in pursuance of a treaty to that effect."

friendly relations with other nations. I refer to that class whose citizenship, though regular in form, but in the light of intent and purpose to which it is applied, is a fraud upon two countries, our own and the country of their nativity—"thus making the claim to American citizenship the pretext for avoiding duties to one country while absence secures them from duties to the other." * From my experience in Turkey I feel justified in saying that a very large proportion of American naturalized citizens of Ottoman origin, who return to their country of origin, come under this class. The same is true to some extent as to the same class of naturalized citizens in other countries.

Our diplomatic relations with Spain for the past fifty years bear proof to the extent our naturalized citizens of Cuban origin were responsible for the chronic state of insurrection, fostered by filibustering expeditions from the United States, which eventually brought on our recent war with Spain.

Our relations with Mexico and with other American Republics would be far less liable to vexatious differences and would be more permanently friendly but for the machinations of this same class of citizens, who return to their country of origin to exploit their native country, and embroil the country of their nominal adoption.

Naturalization effected in the United States without any intent to permanently reside therein, but with a view of residing in another country, especially when such other country is the country of origin, and using such naturalization to evade duties and responsibilities that would otherwise attach to such persons, should be treated by our Government as fraudulent and as imposing no obligation upon it to protect such person. In practice the facts are not always apparent, as all kinds of subterfuges are used to conceal them. Many instances of this kind may be cited, and in some of these our country went to the verge of war in behalf of citizens who never had and could not have any feeling of loyalty to the United States, much less any knowledge or appreciation of our form of government. A case which came near involving us in war with Ecuador occurred in 1885,—that of Julio R. Santos.†

* Secretary Fish, Opinions of the Heads of the Executive Departments relating to Expatriation, Naturalization, and Change of Allegiance. U. S. F. R., 1873.

† F. R., 1886, pp. 224-297.

Santos was born in Ecuador of Ecuadorian parents. He came to the United States where he was naturalized and afterwards returned to the country of his birth, where he was engaged in business for a period of six years, when he was arrested for complicity in the revolution of 1884, for which, together with other rebels, he was tried and convicted. The matter developed much irritation and was a severe strain upon our relation and was not finally settled until our contention was backed up by a man-of-war.

The reason why acquired citizenship has been and will continue to be more abused in the United States than in other countries, is not because during the last hundred years the tide of emigration has been directed to our shores, but because naturalization in other countries is either not so easily acquired or is granted only with the consent of the native State. Such countries wherein naturalization is only granted with consent of the native state, restrictions are generally imposed by the native state as a condition for that consent, while in such countries as come under the former classification, therein as a rule, only a limited naturalization is accorded, which imposes no obligation to protection beyond the jurisdiction of the state granting such naturalization.*

I do not for a moment advocate an abridgment of the American doctrines of citizenship and expatriation, which are so consonant with principles of personal liberty. I do, however, advocate the elimination of those naturalized citizens who, taking advantage of the broad and general provisions of our naturalization laws, not for the purpose of residing in the United States, nor with any intention to respond to the duties citizenship in this country involves, return to their native country, and through their acquired citizenship seek to escape the burdens of their native allegiance. That class who, under the pretext of loyalty for their adopted country, commit treasonable acts in the country of their nativity, and thereby seek to involve the United States in the domestic turmoils and rebellions in their native country. This abuse is not eliminated by our naturalization treaties, it is circumscribed to an extent by the two-year clause in such treaties, but we have found within the two years after the return of naturalized citizens to their native country, or during a residence claimed to be

*For a summary of the laws of other countries upon Naturalization and Expatriation see F. R. of the U. S., 1873, pp. 1276-1293. Hall's International Law, pp. 231-6.

temporary, but in fact permanent, it often happens these citizens have been apprehended as participants in revolutions they have promoted even while residing in the United States pending the acquiring of citizenship.

The dangers from this class of citizens have been largely augmented in recent years by the rapid means of travel on land and sea, together with the facilities of communication by telegraph, coupled with our natural world-wide sympathies for people struggling against oppression.

The Presidents of the United States in their annual messages since our Civil War have again and again called attention to the unsatisfactory and defective condition of our laws. President Grant in his annual message of 1875, referring to this special phase of the subject, says: "In other cases naturalized citizens, immediately after naturalization, have returned to their native country, have become engaged in business; have accepted offices or pursuits inconsistent with American citizenship, and evidence no intent to return to the United States until called upon to discharge some duty to the country where they are residing, when at once they assert their citizenship and call upon the representatives of the Government to aid them in their unjust pretensions. It is but just to all *bona fide* citizens that no doubt should exist in such questions, and that Congress should determine by enactment of law how expatriation may be accomplished and change of citizenship be established." *

President Cleveland in his Annual Message of 1888, says: "That easy and unguarded manner in which certificates of American citizenship can now be obtained has induced a class, unfortunately large, to avail themselves of the opportunity to become absolved from allegiance to their native land, and yet by a foreign residence to escape any just duty and contribution of service to the country of their proposed adoption. Thus, while evading the duties of citizenship to the United States, they may make prompt claim for its national protection and demand its intervention in their behalf. International complications of a serious nature arise." †

As matters now stand, with the law of 1868, which provides that the same protection shall be accorded to naturalized as to

* Richardson's Messages and Papers of the Presidents, Vol. III, 347.
† Id., Vol. VIII, 785.

native born citizens in foreign countries, and in the absence of any laws providing by what voluntary acts or circumstances expatriation is effected, this class of questions, if not the most important, is certainly the most frequently occurring in our diplomacy, is largely left to haphazard, and to contradictory evidence and circumstances for decision.

Secretary Fish, in an instruction to Mr. Washburn, our Minister to France, refers to the difficulties surrounding such cases, and indicates a distinction that must necessarily be made between native-born and such naturalized citizens who have returned to the country of their birth, as to when and whether they are entitled to the protection of our Government. He says: "But where a naturalized citizen returns to his native land to reside, the action of the treaty-making power above referred to would seem to acquire that such agents be jealous and scrutinizing when he seeks their intervention. Even in such cases the purpose of not renouncing the adopted citizenship might be manifested and proven in various ways, &c." * In other words, the Executive Department of our Government through force of circumstances has found itself compelled to read an exception in the Act of 1868, and in certain cases to withhold its protection from naturalized citizens who have returned to their native country and concerning whom the circumstances justified the conclusion they had abandoned their acquired citizenship. In most every case where this conclusion is arrived at, it has been done in contradiction to the person's demand for protection and to his pretension of not having abandoned his United States citizenship. In practice the application of these principles are difficult and at times our Government finds itself committed to the protection of persons for whom it doubtless would have declined to intervene had all the circumstances come to its knowledge before any action had been taken by its naval officers or diplomatic officials, but having once asserted its right to accord protection and having been committed thereto by its agents, it is difficult without loss of national prestige for the Government to recede from its position.

The United States in consonance with the spirit of personal liberty which underlies the fabric of its laws has had a marked influence upon European powers in its maintenance of the right

* F. R. 1873, p. 260.

of expatriation, and in inducing them to recede from the doctrine of perpetual allegiance, therefore, all the more should it have a care to guard that right and prevent it from being perverted and abused to the detriment of its *bona fide* citizens and to the jeopardy of its relations with other nations. Because from the beginning of our Government we have encouraged immigration by liberal laws and freely endowed the emigrants and refugees from the Old World with a new national birth by investing them with the rights and privileges of American citizens, should we be jealous of the duties and obligations those privileges impose by discouraging the immigration of such persons who come among us only to acquire our citizenship as a pretext for seeking our protection upon their return to permanently reside in the country of their birth.

There are several ways of reaching the desired result, either by adopting some such form respecting naturalization as obtains in Great Britain, or by the passage of an amendment to the existing laws to the effect that the return of a naturalized citizen to the country of his nativity, except for a temporary stay or a brief visit, shall be presumptive evidence of the abandonment of his American citizenship. While this will not be a complete remedy, such a law would also have the effect of deterring the immigration of such persons as most abuse the high privileges of American citizenship, and who are a continual menace to our friendly relations with other countries.

The inevitable consequences of our Spanish War together with our keen competition for the markets of the world for our export trade, have involved us, for good or for ill, in the intricacies of the world's diplomacy and has expanded the scope of our fortional press, may, even when least expected, bring on the calameign affairs.

To understand and administer these enlarged interests, to guard and protect our rights, and at the same time to keep clear of strained and interrupted relations, and the many vexatious questions which, under the provocations of home politics and a sensities of war, will demand the highest skill of our Department of State, aided by the trained knowledge of experienced diplomatic agents. It is especially incumbent upon a powerful nation to be just. It can best afford to be generous. It can be so without being charged with weakness. It must often be firm and resolute.

Such characteristics are as effective internationally as inter-personally. To be this, and to do this, we must concede to others the same rights we demand for ourselves, and not invite quarrels from which we must often retreat; quarrels, too, which are most apt to arise at times when nations are most susceptible to irritation, during periods of threatening or pending revolution, or of actual war; when the obligations of neutrality are difficult to maintain; notwithstanding the most watchful care on the part of Governments.

APPENDIX.

STATUTORY HISTORY OF NATURALIZATION IN THE UNITED STATES.

By GAILLARD HUNT,
Chief of the Passport Bureau, Department of State.

In the Declaration of Independence one of the grievances enumerated against George III was:

"He has endeavored to prevent the population of these States; for that purpose obstructing the Laws of Naturalization of Foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new Appropriations of Lands."

"Before the adoption of the Constitution each State exercised the right to naturalize aliens" (Morse on Citizenship, p. 116).

The Constitution provided that the Congress should have power "To establish a uniform Rule of naturalization."

Accordingly, an Act was approved March 26, 1790, providing that a free white alien could be admitted to citizenship, after residing within the limits and under the jurisdiction of the United States for two years, by any common law court of record, after a residence of one year in a particular State, provided he was of good moral character and took an oath to support the Constitution. His naturalization also made his minor children citizens (1 Stat., 103). This Act was repealed by that of January 29, 1795, which required a declaration of intention to become a citizen three years at least before admission, before the "supreme, superior, district or circuit court of some of the States, or of the

territories northwest or south of the river Ohio, or a circuit or district court of the United States," and upon applying for admission to citizenship the applicant must swear to five years' residence in the United States and one year's residence in the State where he applied besides taking the oath of allegiance. But people then residing in the United States were permitted, as under the Act of March 26, 1790, to secure naturalization after a residence of two years. No person proscribed by the legislature of any State and legally convicted of having joined the army of Great Britain during the late war, could be admitted without the consent of the legislature. The Act of 1790 had simply debarred those who had been proscribed by the legislature of a State, until the legislature lifted the proscription (1 Stat., 414). The next general naturalization law was the severest ever passed in this country, and was the outcome of the agitation against aliens which led also to the passage of the alien and sedition laws. It was approved June 18, 1798. It required that an alien must make his declaration of intention five years at least before his admission, and prove residence in the United States for fourteen years and in the State where he applied for five years. Any alien in the United States before the Act of January 29, 1795, might secure naturalization one year after the passage of the Act. If he had made his declaration of intention in accordance with the provisions of the Act of 1795 he might within four years thereafter secure naturalization, if he had lived five years in the United States, and no citizen of a country with which the United States might be at war at the time of his application could be admitted to citizenship. Clerks of courts before which declarations of intention might be made were to transmit abstracts of such declarations to the Secretary of State, and naturalizations were to be similarly reported (1 Stat., 566).

This Act remained in force four years. It was the only one which required a report of naturalization to be made to the executive. It was repealed by the Act of April 14, 1802, the main source from which springs our existing system of naturalization. It provides that a person may be admitted to citizenship:—

First. After making an oath before the supreme, superior, district or circuit court of a State or territory, or a federal circuit or district court, three years at least before application of his declaration of intention.

Second. After taking the oath of allegiance to the United States and of renunciation of his former allegiance.

Third. After having resided in the United States at least five years and in the State where he applied at least one year before his application. He must also establish a good moral character and attachment to the Government.

Fourth. Upon renouncing any title of nobility he may have had. But a citizen of a country with which we might be at war could not be admitted, and an alien resident in the United States before January 29, 1795, might be admitted after a two years' residence

Every free white person arriving in the United States after the approval of the Act, in order to become a citizen, must report himself if twenty-one years old, or be reported if a minor, to some court of record, and his name, nationality, etc., being recorded, receive a certificate of his registration. The children of persons duly naturalized were, if dwelling in this country, to be considered citizens, and the children of citizens born out of the United States enjoyed the same status provided that the citizenship should not descend to persons whose fathers had never resided in the United States. No person proscribed by the legislature of any State for having joined the British Army was to be admitted without the consent of the legislature of the State in which such person was proscribed (II Stat., 153).

The Act of March 26, 1804, modified this Act, so as to permit the naturalization of persons residing in the United States between June 18, 1798, and April 14, 1802, without the previous declaration of intention; and if any one should die after declaring his intention to become a citizen and before he had secured naturalization, his widow and minor children were to be considered citizens upon taking the oaths prescribed by law (II Stat., 282).

The five years' residence before naturalization was restricted by Section 12 of this Act of March 3, 1813, so that no person should be admitted to citizenship who should not have resided for the continued term of five years within the United States without being at any time out of its territory. Section 13 of the same Act provided severe penalties for forging, counterfeiting or selling certificates of citizenship (II Stat., 811).

Both of these enactments were made during a period of war. They were followed by a third, approved June 30, 1813, which permitted the naturalization of persons resident in the United

States June 18, 1812, who had made their declaration of intention, or who were entitled to naturalization without such declaration, notwithstanding the fact that they might be alien enemies according to existing law. Nothing in the Act was to be construed as preventing the apprehension and removal, agreeably to law, of an alien enemy at any time previous to his naturalization (III Stat., 53). Another Act (March 22, 1816), required that the certificate of registry prescribed by the Act of April 14, 1802, and from the clerk of a court of a declaration of intention should be exhibited by every alien on his application to become a citizen, provided he arrived in this country after June 18, 1812, and must be recited in the certificate of naturalization, otherwise he was not to be considered a citizen. This Act was not to apply, however, to persons in the United States between June 18, 1798 and April 14, 1802 (III Stat., 259).

On May 26, 1824, the Act was approved which nearly assimilated to the one now in force on the subject of naturalization of aliens coming to this country during their minority. It provided that a free white person residing in the United States three years next preceding his arrival at the age of twenty-one years, and who had continued his residence therein to the time of his application, might, after arriving at the age of twenty-one, and after five years' residence, including the three years of his minority, be admitted to citizenship without having made the previous declaration of intention required by law. He must make the declaration of intention at the time of his application for citizenship, and state and prove that for three years last past it had been his intention to become a citizen of the United States. The second section of this Act also provided that a certificate of naturalization previously obtained from any court was not to be deemed invalid because of an omission to comply with the requirements of the Act of March 22, 1816, that a certificate of report and registry and of declaration of intention should be exhibited upon application for naturalization. The fourth section provided that the declaration of intention two years before admission to citizenship should be sufficient (IV Stat., 69). The Act of May 24, 1828, repealed so much of the Acts of April 14, 1802, and of March 22, 1816, as required the registry of all foreigners who desired naturalization upon their arrival in this country, and provided that any person residing in the United States between the dates April 14,

1802, and June 18, 1812, and who had continued his residence might be admitted to citizenship without having made a previous declaration of intentions (IV Stat., 310).

The requirements of the Act of March 3, 1813, that the five years' residence should not permit of any absence from the United States was repealed by the Act of June 26, 1848 (IX Stat., 240).

The Act of February 10, 1855, modified so much of the Act of April 14, 1802, as required that the children of citizens born outside of the United States should be considered citizens, if dwelling within the United States, and simply declared them to be citizens, the rights of citizenship not to descend to the children of fathers who had never resided in the United States. The same Act provided that any woman who might herself lawfully be naturalized was to be considered a citizen upon her marriage to an American citizens (X Stat., 604).

During the civil war by the Act of July 17, 1862, it was provided that an alien, over twenty-one years of age, who had enlisted or should thereafter enlist in the army and be honorably discharged might become a citizen upon his petition to a court without having made a previous declaration of intention, and after one year's residence in the United States. The facts of his honorable discharge, residence and good moral character must be established to the satisfaction of the court (XII Stat., 597).

By the Act of April 9, 1866, it was declared: "That all persons born in the United States and not subject to any foreign power, excluding Indians not taxed, are hereby declared to be citizens of the United States" (XIV Stat., 27). This was followed by the fourteenth amendment to the Constitution, proclaimed July 28, 1868, which said: "All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside."

Deserters from the army or navy forfeiting, under the law, their citizenship, the Act of July 19, 1867, prescribed that this penalty should not be held to apply to those who faithfully served according to the terms of their enlistment up to April 19, 1865 (XV Stat., 14).

In 1868, July 27, important action was had by Congress with reference to the right of abandonment of citizenship and protec-

tion of American citizens abroad. The Act passed was entitled, "An Act concerning the Rights of American Citizens in Foreign States." The preamble declared that the right of expatriation was natural and inherent, that this country freely received emigrants from all countries and invested them with the rights of citizenship; that it was, nevertheless, claimed that these citizens and their descendants owed allegiance to foreign governments, and that it was necessary that this claim be disavowed. Therefore, "any declaration, instruction, opinion, order, or decision of any officers of this Government which denies, impairs, or questions the right of expatriation, is hereby declared inconsistent with the fundamental principles of this Government." Further, "That all naturalized citizens of the United States, while in foreign States, shall be entitled to, and shall receive from this government, the same protection of persons and property that is accorded to native-born citizens in like situations and circumstances." Whenever the President should ascertain that any citizen of the United States had been unjustly deprived of his liberty by any foreign Government, he should enquire the reason of his imprisonment, and if he found it to be wrongful should demand his release and use means to effect it, short of an act of war, and report the facts to Congress (XV Stat., 223, 224).

The Act of June 17, 1870, establishing the Police Court of the District of Columbia, prohibited (Sec. 5) that court from naturalizing foreigners (Stat. XVI, 154).

The last section of the Act of July 14, 1870, extending the naturalization laws to aliens of African nativity and of African descent (XVI Stat., 256). Before that they had applied only to "free white" persons. The same Act provided heavy penalties for obtaining or using false naturalization certificates (XVI, Stat. 254).

American seamen enjoy, under Section 29, of the Act of June 7, 1872, an exceptional status with reference to citizenship. Every seamen, being a foreigner, who makes his declaration of intention to become an American citizen before a competent court, and who shall subsequently serve three years on board a merchant ship of the United States may secure citizenship by proving the facts to the satisfaction of the court. For all purposes of protection he is to be deemed an American after making the declaration of intention (XVII Stat. 268).

The Act of February 1, 1876, amended the Act of April 14, 1802, relative to the declaration of intention so that it might be made before the clerk of any of the courts named in that law, and made valid all declarations of intention that had already been so made (XIX Stat. 2).

The Act of April 9, 1866, excluded from the category of citizens "Indians not taxed," but the Act of February 8, 1887, allotting land in severalty to Indians provided (Sec. 6) that every Indian born within the territorial limits of the United States, to whom allotments should be made and who should voluntarily take up his residence apart from any tribe of Indians and adopt the habits of civilized life, should be entitled to all the rights of American citizenship (XXIV Stat. 390). Under the Act of March 3, 1893 (Section 15), lands in severalty were allotted to the Cherokees, Creeks, Choctaws, Chickasaws and Seminoles, and upon the allotment being effected they were to be citizens (XXVII Stat. 645).

Privileges such as are enjoyed by soldiers have never been extended to the same extent to sailors in the navy, but the Act of July 24, 1894, making appropriations for the naval service prescribed that any alien twenty-one years old, who has served or may serve five consecutive years in the navy, or one enlistment in the marine corps, and has been honorably discharged shall be admitted to citizenship by a competent court without having made a previous declaration of intention (XXVIII Sta. 124).*

*See Hunt's "American Passport," Washington Government Printing Office, 1898.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE PRESENT STATUS OF THE PROTECTED CRUISER TYPE.

By NAVAL CONSTRUCTOR D. W. TAYLOR, U. S. N.

Broadly speaking, the protected cruiser is less than thirty years old. The oldest vessel classed as a cruiser to be found in Brassey is the English Iris, of 3730 tons, launched in 1877. Brassey does not give any deck thickness for the Iris. The Champion, of 2380 tons, launched in 1878, is however, said to have a thickness of protective deck of 1½ inches.

Owing to the comparatively recent origin of the type, the navy lists of to-day contain practically all the protected cruisers that have been built, except those that have been lost by stranding or otherwise. This being the case, I have taken the last Brassey (for 1903) and prepared Table I, showing, for Great Britain, France, Germany, Russia, the United States and Italy, the name and displacement of protected cruisers launched each year since 1877. I have taken as protected cruisers all vessels classed by Brassey as cruisers. From the data in Table I, I have prepared Fig. 1, which shows graphically the tonnage of protected cruisers launched each year for the six navies referred to. Fig. 1 extends from 1876 to the end of 1902, the ordinates showing, in each case, the total tonnage of cruising ships launched during the year, which still existed in 1903.

The notable feature of Fig. 1 is the sudden cessation of launching protected cruisers, which began about 1898. This is attributable, of course, to the development of the armored cruiser.

Fig. 2 refers only to British ships. It repeats the data for the protected cruisers of this nation in Fig. 1, and gives similar data for the English battleships and armored cruisers. It will

be seen that there was no halt in the construction of battleships in England about 1898, but the cessation in building cruisers was accompanied by the rapid development of the armored cruiser.

The armored cruiser, in Great Britain, according to classification, is about twenty years old, and in 1887 this nation had over 50,000 tons of them afloat. These cruisers, however (although in any classification, they must be classed as armored cruisers), are not very close to the modern conception of these vessels. They consist of the Imperieuse and Warspite, originally designed with sails and with a maximum speed of about 17 knots only, and a half-dozen vessels of the Orlando class, of 5600 tons displacement and 18 knots trial speed. The real development of the type in England dates to the early 90's, the first armored cruiser, in the modern acceptation of the term, being probably the French vessel Dupuy de Lome, launched in 1890. The cause of the obsolescence, so to speak, of the protected cruiser type is not far to seek. With the development of high explosive shell and the marked increase in the muzzle velocity of naval guns, the value of the protective deck, which, at best, protected the armament and gunners not at all, was almost entirely nullified. The Bureau of Ordnance, for instance, says, with reference to the protective deck:

"The Bureau believes that no plate can be manufactured that will resist an attack at a striking velocity at all approaching the muzzle velocities obtained to-day, when the shot is delivered at an angle approximating that at which the plate would probably be struck in service."

The ground in this connection appears to be well covered by M. De Lanessan, Member of the Chamber of Deputies, and late Minister of Marine in France, in his book "La Programme Maritime," 1900-1906, as translated in the *Journal of the Royal United Service Institution* of England. M. De Lanessan writes:

CRUISERS.

"The second category of large ships in all modern navies are those which came under the general classification of cruisers.

"Their leading feature should be the predominance of speed and radius of action over offensive power and protection.

"In the earlier history of modern cruisers such an importance was attached to speed, that everything, even radius of action, was sacrificed to it. It was an epoch when the dimensions of the ships were diminished of set purpose in order to have a larger number of the same type, it being considered that the number of units was of greater importance than their power.

PROTECTED CRUISERS.

"This period was marked by the construction in every navy, but more particularly in ours, where the idea originated, of ships with displacements of from 1500 to 2000 tons, in which every effort was made to attain the highest speed, which could be reached at that time, but at the sacrifice of every other quality, owing to their small displacement. Their offensive power was represented by a small number of medium-sized and small-calibre guns, with two or three torpedo discharges for use against battle-ships if any opportunities presented themselves. The only protection was afforded by a thin steel armor deck, which extended the whole length of the ships at the waterline, below which was the machinery. The radius of action was necessarily limited, owing to the small size of the ships. We have no hesitation in saying that these cruisers have two grave defects. In the first place, their protection and armament are now recognized to be far too weak. In the second place, experience has shown that the speed for which everything else has been sacrificed was a merely nominal one, since it fell off very rapidly when the ship had to struggle against ever so little a sea. One knows to-day, as the result of experience, that no fast cruisers of less than 4000 tons displacement can hope to maintain, in spite of the sea, a speed anything like that attained at her trials.

"These larger displacements were adopted as soon as the necessity for them was clearly demonstrated; but the only protection for these fast cruisers continued to be an armored deck, and coffer-dams running along the side above this deck. The economy realized, however, by the weights which represented protection, served to increase the offensive power, particularly in the matter of Q. F. guns of a medium calibre.

"During the last fifteen years there have been built in France, England, Germany, and Italy a very large number of these so-called 'protected' cruisers, the speed of which is more or less considerable. England possesses to-day 130, France 33, and Germany 25 of this kind of vessel. As it became necessary to add to the offensive power, so little by little the displacement increased. In England, in the Powerful and her unique sister the Terrible, it rose to 14,200 tons. In France in the Guichen, we have reached 8280 tons, with a speed of 23 knots, and a ship which is the most perfect type of her class. In spite, however, of her comparatively speaking large displacement, which raised the cost of her construction to nearly 16,000,000 francs (640,000 l.), and the cost of maintaining her in commission to more than a million francs (40,000 l.), the Guichen and her sister the Chateaurenault are condemned by all our officers on account of their weak armament, which is composed of only two 6.4-inch Q. F. and six 5.5-inch Q. F. guns, with twelve 3-pounders."

ARMORED CRUISERS.

"Nearly every navy has now given up the construction of protected cruisers, as it is realized that a vast expense has been incurred on a class of vessels which, although they may be able to work mischief against unprotected merchant ships, are quite incapable of holding their own against any ship better protected than themselves, and may even be put *hors de combat* by a simple armed mail-boat. Consequently, during the

last few years, all navies have striven to give at least a certain number of their cruisers a relatively speaking fair amount of protection.

"France was the country which set an example to other countries in this matter. In July, 1888, the Dupuy de Lome was laid down, a vessel where protection was afforded not only by an armored deck, but also by armor which covered her hull from end to end, to a height of some 12 feet above the waterline. Her armament was for those days a very powerful one, consisting as it did of two 7.6-inch, and six 6.4-inch Q. F. guns, with six 9- and six 3-pounders. The 7.6-inch and 6.4-inch guns were mounted in turrets protected by 5-inch armor. Unfortunately, owing to her limited displacement (6780 tons), it was not possible to give her a greater speed than 19 knots, so she cannot compete with ships of the same class, which are being laid down to-day, all of which can steam from 21 to 23 knots; her small displacement also did not allow of proper protection being given to her hull, her side armor being only 4 inches thick, which is quite insufficient even against the medium guns of similar foreign ships.

"After the Dupuy de Lome, between 1889 and 1903, we laid down five other armored cruisers with displacements varying from 4000 to 5500 tons, all of which had the same qualities and the same faults as their predecessors; especially in the matter of speed, which did not exceed 19 knots."

Fig. 1 and Fig. 2, apart from any argument, appear to me to show conclusively the general appreciation, about 1895, of the fact that vessels of the protected cruiser type were not worth the money put into them in comparison with other types. Of course, there is another side of the question, and it might be argued that the nations in question had a large number of protected cruisers and did not find it necessary to build more for a time. It is almost ten years now, however, since the laying down of protected cruisers came to a halt, and there does not appear to be much tendency to resume their construction. It may be pointed out that, since 1895, the Spanish War demonstrated very conclusively the exceeding vulnerability of the protected cruiser type. The old idea was that, in the protected cruiser, the vitals of the ship were protected by the deck. I think it will be generally admitted that experience in the Spanish War showed that protected cruisers could be practically annihilated without penetrating the deck. Since then, the advance in ordnance has seriously reduced the protection afforded by the protective deck.

It is generally admitted that there are needed types of vessels other than battleships and armored cruisers, but it would seem to be exceedingly doubtful whether the protected cruiser deserves to be reproduced at all, that is to say, a vessel in which a large amount of weight is given to deck protection and no other protection admitted, except, perhaps, shields on the guns. It seems

DIAGRAM SHOWING TONNAGE OF BRITISH VESSELS LAUNCHED EACH YEAR—1880-1903, INCLUSIVE.

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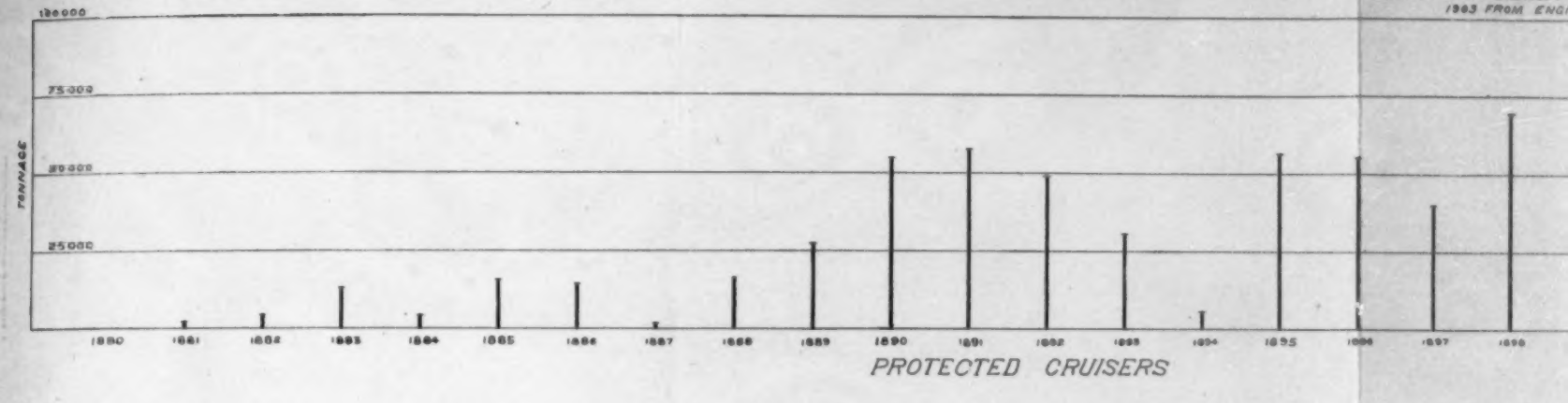
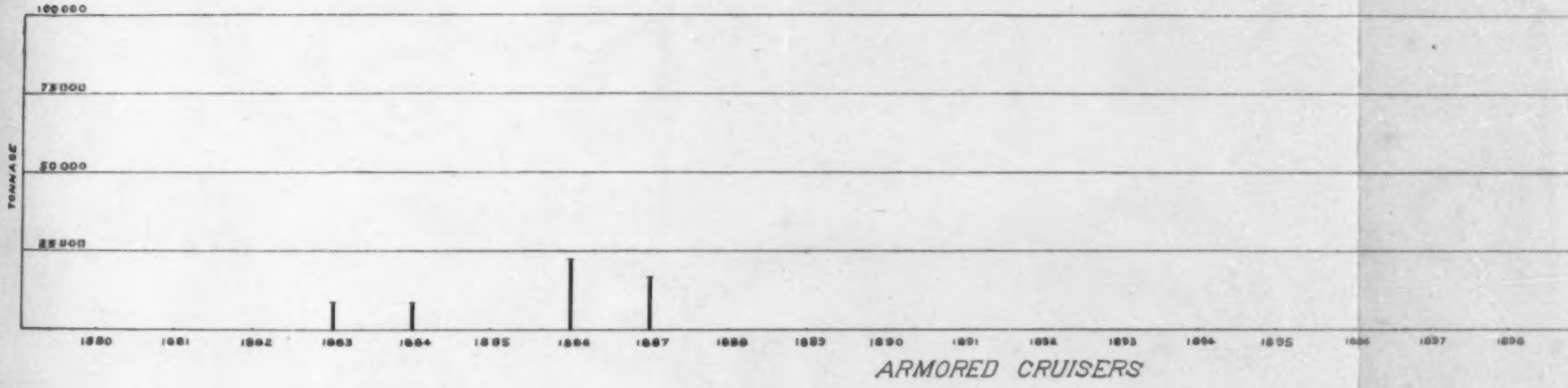
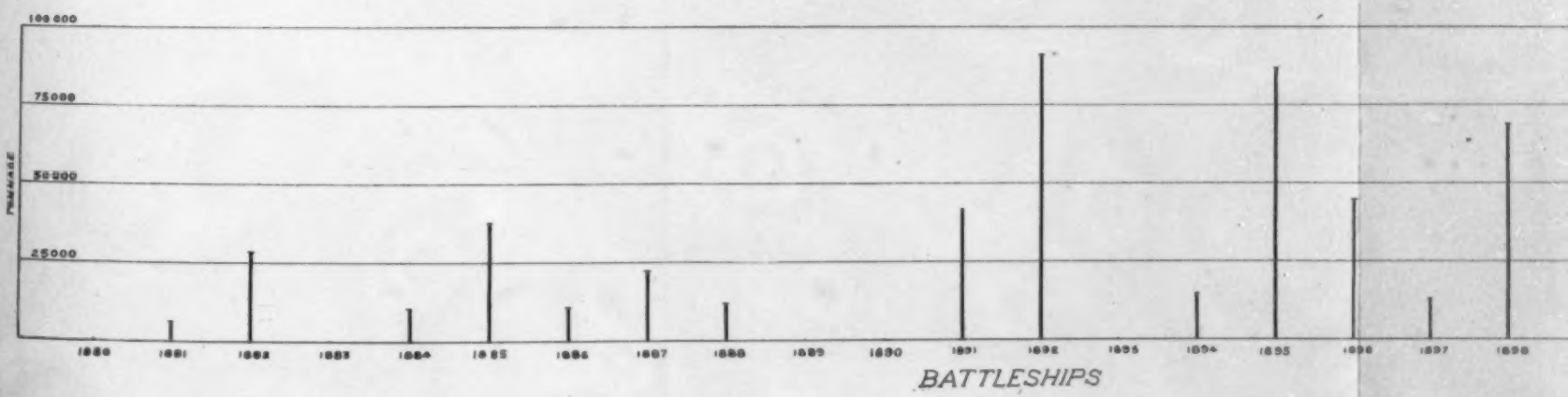


PROTECTED CRUISERS



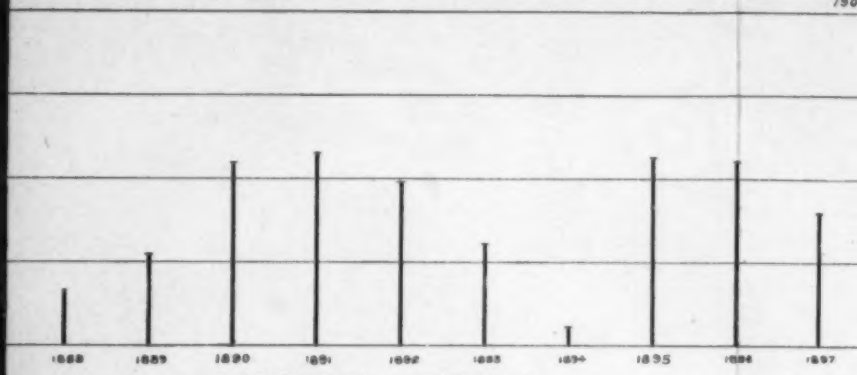
ARMORED CRUISERS



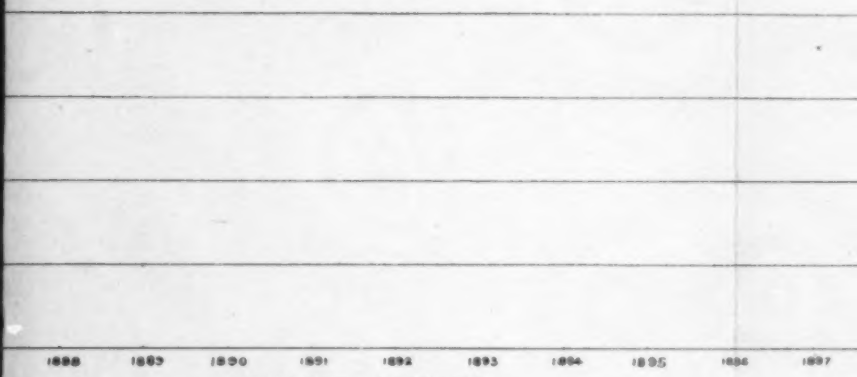
BATTLESHIPS

NNAGE OF BRITISH VESSELS LAUNCHED EACH YEAR—1880-1903, IN

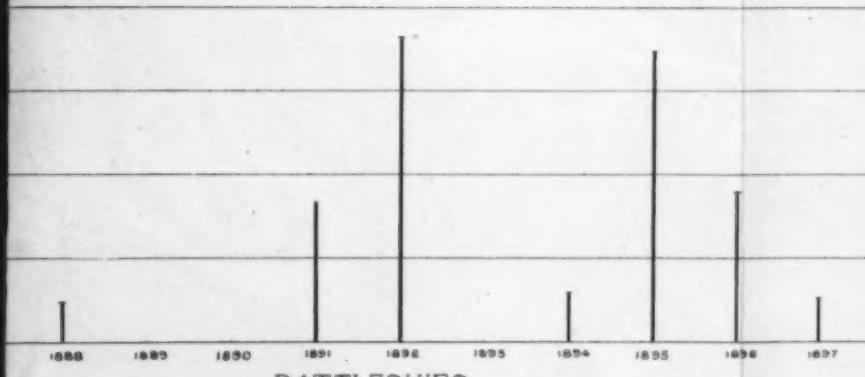
NOTE · FR
190



PROTECTED CRUISERS



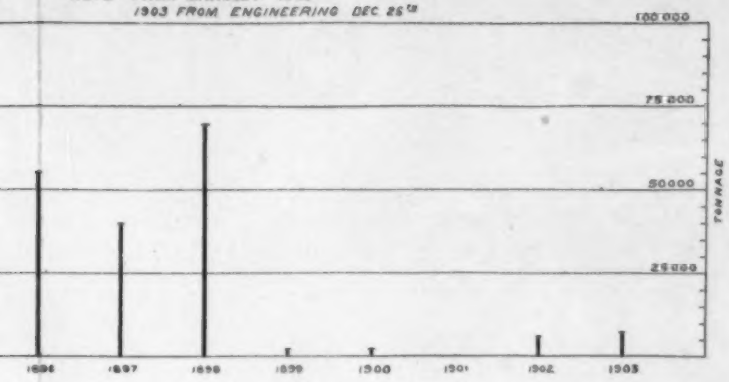
ARMORED CRUISERS

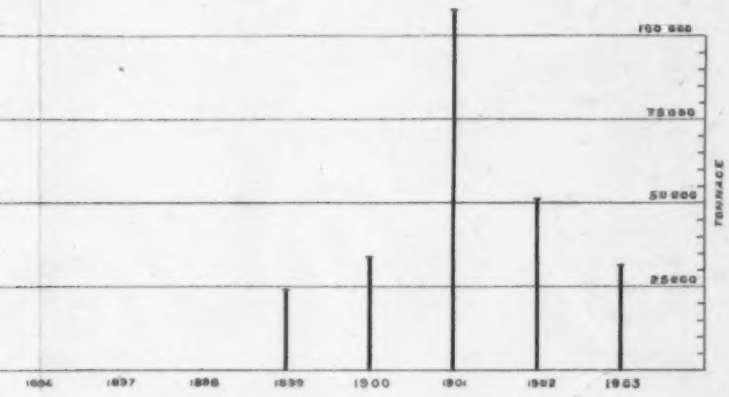


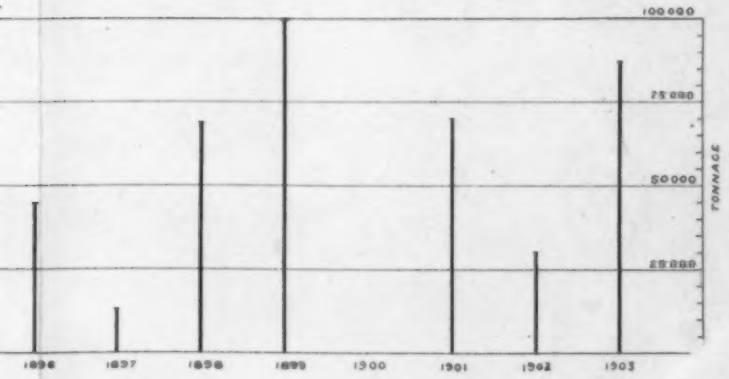
BATTLESHIPS

—1880-1903, INCLUSIVE.

NOTE - FROM BRASSEY 1903
1903 FROM ENGINEERING DEC 26TH



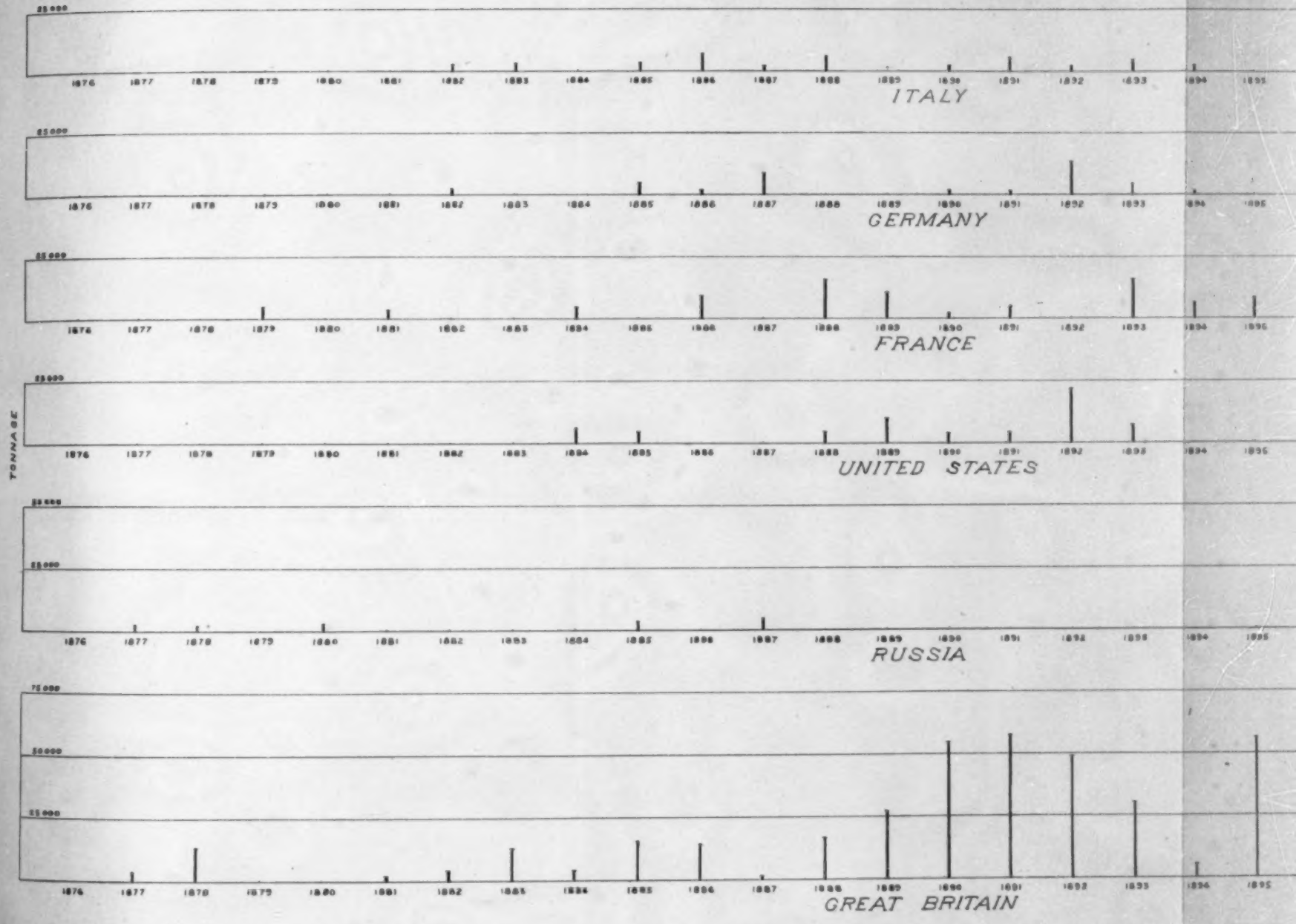




TONNAGE

DIAGRAM SHOWING ANNUAL TONNAGE OF PROTECTED CRUISERS LAUNCHED—1876-19

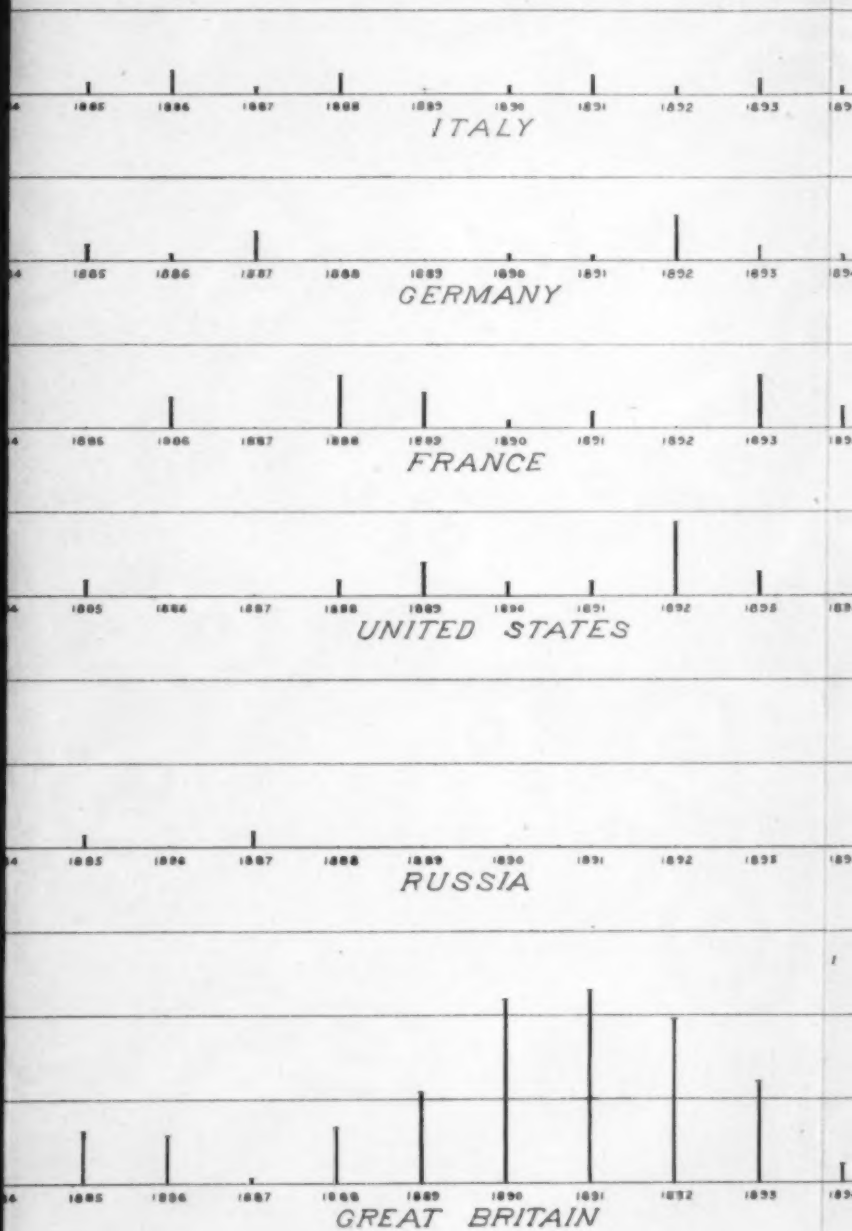
NOTE DATA FROM BRASSEY 1903



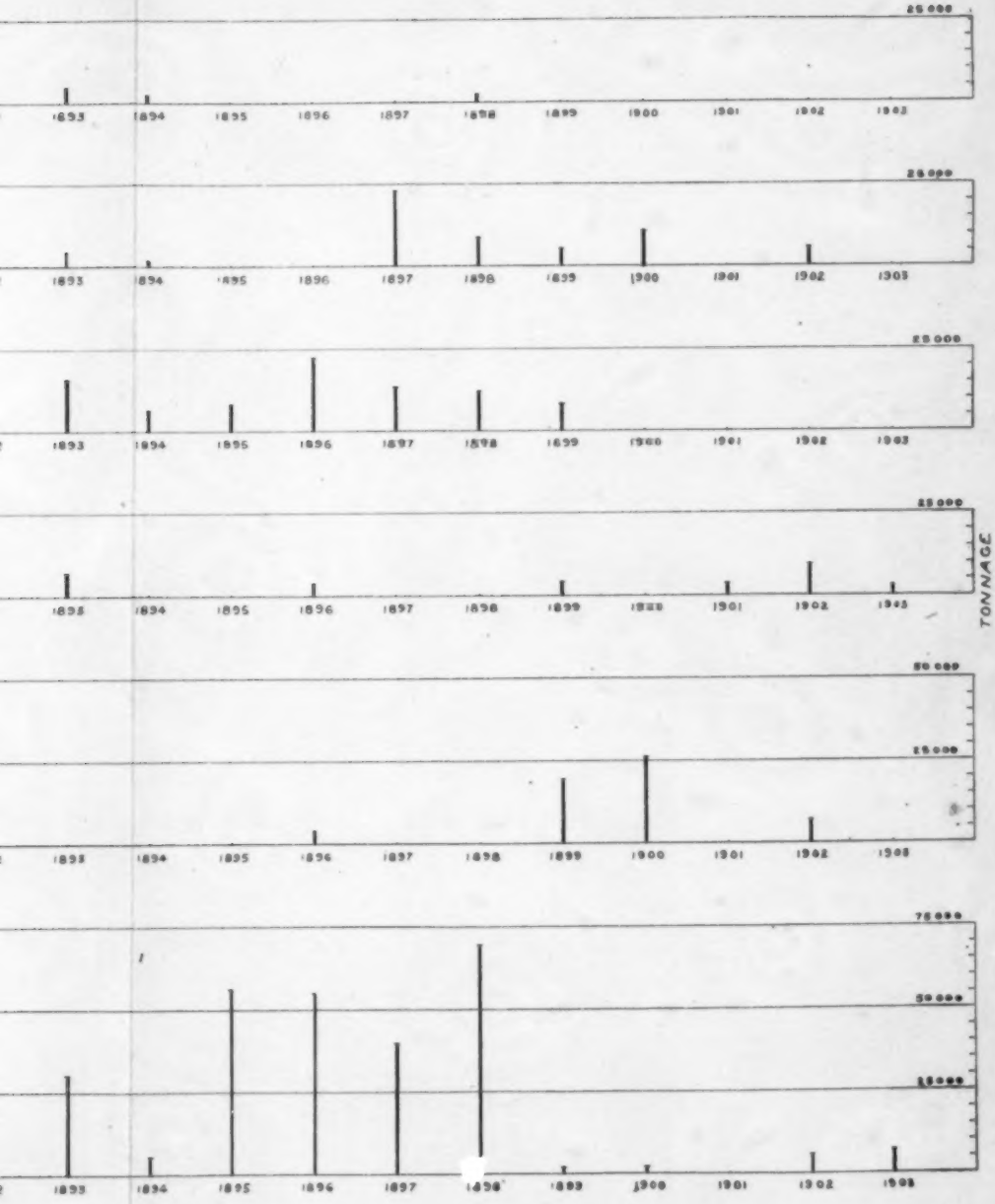
TONNAGE

SHOWING ANNUAL TONNAGE OF PROTECTED CRUISERS LAUNCH

NOTE: DATA FROM BRASSEY 1903



ERS LAUNCHED—1876-1903.



to me, all things considered, that the true line of advance would be in the direction of abandoning the protective deck entirely and putting the weight saved into more remunerative features. There appears to be no reason why the new scout type could not do all of the work now done by the protected cruisers of the navy, and much more valuable work in time of war.

Some years ago I advocated in the Naval Institute the adoption of the steam turbine for main propelling machinery. This will shortly be tried in our service on a large scale, and if as successful as its advocates expect, will enable cruisers to be designed which will be a marked advance upon anything we now have. I should anticipate that it would be possible to design a 5000-ton vessel without a protective deck (with watertight deck only) which would reach nearly 30 knots on trial and would be able to maintain at sea, in ordinary weather, more than double the speed of a fleet of battleships. Such vessels would have no difficulty in coping with converted liners. Such a design, however, or an approximation to it, would be utterly impossible if an attempt is made to obtain deck protection. The Baltimore, which approximates 5000 tons displacement, has a weight of nearly 600 tons in her protective deck, or say 12 per cent of her displacement. A 5000-ton vessel of extreme speed would, however, require to be certainly more than half as long again as the Baltimore and should probably have 75 per cent more waterline area.

Year of Launch.	GREAT BRITAIN.		FRANCE.		GERMANY.		UNITED STATES.		RUSSIA.		ITALY.	
	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.
1877....	Iris.....	3730	.....	....	.....	....	.....	....	Afrika.....	2590	.....	....
1878....	Champion	2380	.....	....	.....	....	.....	....	Asia.....	2500	.....	....
	Cleopatra.....	2380	.....	....	.....	....	.....	....	.....	....	.....	....
	Comus	2380	.....	....	.....	....	.....	....	.....	....	.....	....
	Curacoa.....	2380	.....	...	.....	...	.....	....	.....	....	.....	....
	Mercury	3730	.....	....	.....	....	.....	..	.....	....	.....	....
1879...	.....	....	D'Estaing	2435	.....	....	.....	....	.....	....	.....	....
	.....	...	Forfait	2464	.....	....	.....	....	.....	....	.....	....
1880....	.....	....	.....	.. .	.....	....	.....	....	Pamyat Merkuriya	3050	.....	....
1881....	Cordelia	2380	Naide	3686	.....	....	.....	...	.....	....	.....	....
1882....	Arethusa	4300	.....	....	Blitz	1382	.....	....	.....	....	Amerigo Vespucci..	2795
					Pfeil	1382						
1883....	Amphion	4300	.....	....	.....	....	.....	....	.....	....	Giovanni Bausan....	3068
	Calypso	2770	.....	....	.....	....	.....	....	.....	....	.....	....
	Phaeton	4300	.....	....	.....	....	.....	....	.....	....	.....	....
	Royalist	1420	.....	....	.....	....	.....	....	.....	....	.....	....
1884....	Calliope.....	2770	Sfax.....	4726	.....	....	Atlanta.....	3000	.....	...	.....	....
	Pylades.....	1420	. ....	....	.....	...	Boston.....	3000	.....	....	.....	....
1885....	Archer....	1770	.....	....	Alexandrine	2373	Chicago.....	4500	Rynda	3508	Etna	3530
	Mersey.....	4050	.....	...	Merkur (ex Arcona)	2373	.....	....	.....	....	.....	....
	Scout	1580	.....	....	.....	....	.....	....	.....	....	.....	...
	Severn	4050	.....	....	.....	....	.....	....	.....	....	.....	....
	Thames.....	4050	.....	....	.....	....	.....	....	.....	....	.....	....
1886...	Brisk	1770	Milan	1733	Greif.....	2000	.....	....	.....	....	Vesuvio	3427
	Cossack.....	1770	Tage	7580	.....	....	.....	...	.....	....	Stromboli.....	3475
	Fearless	1580	.....	....	.....	....	.....	....	.....	....	.....	..
	Forth	4050	.. ...	....	.....	....	.....	....	.....	....	.....	....
	Mohawk	1770	.....	....	.....	....	.....	....	.....	...	.....	....
	Porpoise.....	1770	.....	....	.....	...	.....	...	.....	....	. ...	....
	Tartar	1770	.....	....	.....	....	.....	....	.....	....	.....	....
1887....	Raccoon	1770	.....	....	Irene	4400	.....	....	Admiral Kornilof	6000	Dogali	2088
					Prinzess Wilhelm...	4400						

Year of Launch.	GREAT BRITAIN.		FRANCE.		GERMANY.		UNITED STATES.		RUSSIA.		ITALY.	
	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.
1888....	Magicienne....	2950	Castille.....	7700	.....	....	.....	....	.....	....	.....	....
	Medea	2950	.....	....	.....	....	.....	....	.....	....	.....	....
	Medusa	2950	.....	....	.....	....	.....	....	.....	....	.....	....
	Melpomene....	2950	.....	....	.....	....	.....	....	.....	....	.....	....
	Minerva	2950	.....	....	.....	....	.....	....	.....	....	.....	....
	Naiad	2950	.....	....	.....	....	.....	....	.....	....	.....	....
	Nymphe	2950	.....	....	.....	....	.....	....	.....	....	.....	....
	Thetis	2950	.....	....	.....	....	.....	....	.....	....	.....	....
1889....	Blenheim.....	9000	Charlemagne....	9517	.....	....	.....	....	.....	....	.....	....
	Blake	9000	.....	....	.....	....	.....	....	.....	....	.....	....
	Howe	9000	.....	....	.....	....	.....	....	.....	....	.....	....
	Rodney	9000	.....	....	.....	....	.....	....	.....	....	.....	....
	Sans Pareil....	9000	.....	....	.....	....	.....	....	.....	....	.....	....
	Camperdown....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Anson	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Rodney	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Trafalgar.....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Howe	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Benbow	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Collingwood....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Hood	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Nelson	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Renown	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Repulse	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Resolution....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Revenge	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Royal Oak.....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Royal Sovereign	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Victoria	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Centurion.....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Barfleur	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Hero	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Tenedos	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Ramillies.....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Repulse	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Resolution....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Revenge	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Royal Oak.....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Royal Sovereign	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Victoria	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Centurion.....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Barfleur	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Hero	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Tenedos	10,600	.....	....	.....	....	.....	....	.....	....	.....	....
	Ramillies.....	10,600	.....	....	.....	....	.....	....	.....	....	.....	....

Year of Launch.	GREAT BRITAIN.		FRANCE.		GERMANY.		UNITED STATES.		RUSSIA.		ITALY.	
	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.
1888....	Magicienne	2950	Cecille	5933	.....	....	Baltimore	4413	.....	....	Fieramosca	3600
	Marathon	2950	Cosmao	1954	.....	....	.....	....	.....	....	Piemonte	3500
	Medea	2800	Forbin	1920	.....	....	.....	....	.....	....	.....	....
	Medusa	2800	Lalande	1926	.....	....	.....	....	.....	....	.....	....
	Melpomene	2950	Surcouf	2044	.....	....	.....	....	.....	....	.....	....
	Pearl	2575	Troude	2026	.....	....	.....	....	.....	....	.....	....
1889....	Barham	1830	Alger	4382	.....	...	.....	....	.....	....	.....	....
	Barracouta	1580	Coetlogon	1932	.....	....	Philadelphia	4324	.....	....	.....	....
	Barrosa	1580	Jean Bart	4109	.....	....	San Francisco	4098	.....	....	.....	....
	Blake	9000	.....	....	.....	....	.....	....	.....	....	.....	....
	Blanche	1580	.....	....	.....	....	.....	....	.....	....	.....	....
	Blonde	1580	.....	....	.....	...	.....	....	.....	....	.....	....
	Mildura	2575	.....	....	.....	....	.....	....	.....	....	.....	....
	Katoomba	2575	.....	....	.....	....	.....	....	.....	....	.....	....
	Tauranga	2575	.....	....	.....	....	.....	....	.....	....	.....	....
	Wallaroo	2575	.....	....	.....	....	.....	....	.....	....	.....	....
1890....	Andromache	3400	Davout	2291	Bussard	1857	Newark	4098	.....	....	Lombardia	2380
	Bellona	1830	.....	....	.....	....	.....	....	.....	...	.....	....
	Blenheim	9000	.....	....	.....	....	.....	....	.....	....	.....	....
	Edgar	7350	.....	....	.....	....	.....	....	.....	....	.....	....
	Latona	3400	.....	....	.....	....	.....	....	.....	....	.....	....
	Melampus	3400	.....	....	.....	....	.....	....	.....	....	.....	....
	Naiad	3400	.....	....	.....	....	.....	....	.....	....	.....	....
	Pallas	2575	.....	....	.....	....	.....	....	.....	....	.....	....
	Philomel	2575	.....	....	.....	....	.....	....	.....	....	.....	....
	Phoebe	2575	.....	....	.....	....	.....	....	.....	....	.....	....
	Pique	3600	.....	....	.....	....	.....	....	.....	....	.....	....
	Ringarooma	2575	.....	....	.....	....	.....	....	.....	....	.....	....
	Sirius	3600	.....	....	.....	....	.....	....	.....	....	.....	....
	Terpsichore	3400	.....	....	.....	....	.....	....	.....	....	.....	....
	Thetis	3400	.....	....	.....	....	.....	....	.....	....	.....	....
1891....	Apollo	3400	Isly	4477	Falke	1731	Detroit	2089	.....	....	Etruria	2380
	Brilliant	3600	.....	....	.....	....	Montgomery	2089	.....	...	Umbria	3427
	Endymion	7350	.....	....	.....	....	.....	....	.....	....	.....	....
	Indefatigable	3600	.....	....	.....	....	.....	....	.....	....	.....	....
	Hawke	7350	.....	....	.....	....	.....	....	.....	....	.....	....
	Intrepid	3600	.....	....	.....	....	.....	....	.....	....	.....	....
	Iphigenia	3600	.....	....	.....	....	.....	....	.....	....	.....	....
	Rainbow	3600	.....	....	.....	....	.....	....	.....	....	.....	....
	Retribution	3600	.....	....	.....	....	.....	....	.....	....	.....	....

Year of Launch.	GREAT BRITAIN.		FRANCE.		GERMANY.		UNITED STATES.		RUSSIA.		ITALY.	
	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.
1891	Royal Arthur	7700										
	Sappho	3400										
	Spartan	3600										
	Tribune	3400										
1892	Aeolus	3600			Condor	1640	Cincinnati	3213			Cristoforo Colombo	2280
	Bonaventure	4360			Cormoran	1640	Columbia	7375				
	Crescent	7700			Kaiserin Augusta	6331	Marblehead	2089				
	Gibraltar	7700			Seeadler	1640	Olympia	5870				
	Grafton	7350			Sophie	2100	Raleigh	32 3				
	Scylla	3400										
	St. George	7700										
	Theseus	7350										
1893	Astraea	4360	Bugeaud	3740	Gefion	4207	Minneapolis	7357			Elba	2730
	Cambrian	4360	Chasseloup-Laubat	3758							Liguria	2280
	Charybdis	4360	Fleurus	1310								
	Flora	4360	Friant	3739								
	Forte	4360	Suchut	3440								
	Fox	4360										
	Hermione	4360										
1894	Eclipse	5600	Descartes	3990	Geier	1776					Calabria	2442
			Linois	2345								
1895	Diana	5600	Du Chayla	3952								
	Juno	5600	Pascal	4015								
	Minerva	5600										
	Powerful	14200										
	Talbot	5600										
	Terrible	14200										
	Venus	5600										
1896	Arrogant	5800	Cassard	3952			New Orleans	3769	Svietlana	3828		
	Diadem	11000	Catinat	4065								
	Dido	5600	D'Assas	4000								
	Doris	5600	D'Entrecasteaux	8114								
	Furious	5750	Gallilee	2317								
	Gladiator	5750										
	Isis	5600										
	Pelorus	2135										
	Proserpine	2135										
	Vindictive	5800										
1897	Andromeda	11000	D'Estrees	2452	Freya	5650						
	Europa	11000	Quichen	2317	Gerthe	5650						
	Niobe	11000	Lavoisier	2317	Victoria Luise	5650						

Year of Launch.	GREAT BRITAIN.		FRANCE.		GERMANY.		UNITED STATES.		RUSSIA.		ITALY.	
	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.
1897	Pactolus	2135			Vineta	5900						
	Pegasus	2135										

Year of Launch.	GREAT BRITAIN.		FRANCE.		GERMANY.		UNITED STATES.		RUSSIA.		ITALY.	
	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.	Name.	Disp.
1897....	Pactolus	2135	.....	....	Vineta	5900	.....	....	.....	....	.....	....
	Pegasus	2135	.....	....	.....	....	.....	....	.....	....	.....	....
	Pomone	2135	.....	....	.....	....	.....	....	.....	....	.....	....
1898....	Amphitrite	11000	Chateaurenault	8018	Gazelle	2650	.....	....	.....	....	Puglia	3550
	Argonaut	11000	Protet	4055	Hansa	5900	.....	....	.....	....	.....	....
	Ariadne	11000	.....	....	.....	....	.....	....	.....	....	.....	....
	Hermes	5900	.....	....	.....	....	.....	....	.....	....	.....	....
	Highflyer	5900	.....	....	.....	....	.....	....	.....	....	.....	....
	Hyacinth	5900	.....	....	.....	....	.....	....	.....	....	.....	....
	Perseus	2135	.....	....	.....	....	.....	....	.....	....	.....	....
	Prometheus	2135	.....	....	.....	....	.....	....	.....	....	.....	....
	Psyche	2200	.....	....	.....	....	.....	....	.....	....	.....	....
	Pyramus	2135	.....	....	.....	....	.....	....	.....	....	.....	....
	Spartiate	11000	.....	....	.....	....	.....	....	.....	....	.....	....
1899....	Pioneer	2200	Infernet	2452	Niobe	2665	Albany	3769	Diana	6630	.....	....
	.....	....	Jurien de la Graviere	5685	Nymphe	2665	.....	....	Pallada	6630	.....	....
	.....	....			.....	....	.....	....	Varyag	6500	.....	....
1900....	Pandora	2200	.....	....	Amazone	2665	.....	....	Askold	6100	.....	....
	.....	....	.....	....	Ariadne	2665	.....	....	Aurora	6630	.....	....
	.....	....	.....	....	Medusa	2665	.....	....	Bogatyr	6750	.....	....
	.....	....	.....	....	Thetis	2665	.....	....	Boyarin	3200	.....	....
	.....	....	.....	....	.....	....	.....	....	Novik	3200	.....	....
1901....	.....	...	.....	....	.....	....	Cleveland	3200	.....	....	.....	....
1902....	Challenger	5880	.....	....	Arcona	2665	Denver	3200	Otchakoff	6670	.....	....
	.....	....	.....	....	Frauenlob	2665	Des Moines	3200	.....	....	.....	....
	.....	....	.....	....	.....	....	Galveston	3200	.....	....	.....	....
1903....	.....	....	.....	....	.....	....	Chattanooga	3200	.....	....	.....	....
	.....	....	.....	....	.....	....	Tacoma	3200	.....	....	.....	....
Bldg ..	Amethyst	3000	.....	....	K	3000	.....	....	Almaz	2385	.....	....
	Diamond	3000	.....	....	L	3000	.....	....	Izumrud	3100	.....	....
	Encounter	5880	.....	....	Zieten	3000	.....	....	Jentchug	3100	.....	....
	Sapphire	3000	.....	....	.....	....	.....	....	Kagul	6250	.....	....
	Topaze	3000	.....	....	.....	....	.....	....	Oleg	6670	.....	....
	.....	....	.....	....	.....	....	.....	....	Vitiaz	6675	.....	....
	.....	....	.....	....	.....	....	.....	....	Two unnamed	6670	.....	....
	.....	....	.....	....	.....	....	.....	....	One unnamed	3200	.....	....
Pro....	.....	....	.....	....	M	3000	.....	....	.....	....	.....	....
	.....	....	.....	....	Merkur (Ersatz)	3000	.....	....	.....	....	.....	....

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

ON THE PREVENTION OF INFECTIOUS DISEASES.

By SURGEON HENRY G. BEYER, U. S. Navy.

* LECTURE I.

Hygiene has many functions, being defined by various writers, writing at different periods of time, as signifying the prevention of disease and sickness; or as treating the actually sick by hygienic means rather than by drugs, such as constitutes, for instance, the present method of open-air treatment of consumption; or as the care of the well by the instruction of the people at large in the laws of hygienic living; or, finally, it is also spoken of as the science and art of raising the standard of human health, growth and development by all conceivable means, including systematic bathing and exercising the body as well as the mind, in strict accordance with the best principles prescribed by human physiology.

Like everything else, in these stirring times of universal progress, our conception of the term "hygiene" has gradually undergone a process of evolution and change; it has become more and more comprehensive as time went on. As our knowledge of and our experience with the subject increased from day to day, the depth and the extent of the meaning and significance of the term "hygiene" have deepened and widened correspondingly. Hygiene means all these things and more besides.

In some of my former lectures which I had the pleasure of giving at this college, I attempted to give a more or less systematic account of the elements of hygiene. My previous experience has convinced me that this would be impossible to do, even supposing I had eight or ten lecture hours at my disposal to do it in. In the two lectures which I have been requested to deliver

*Read at the U. S. Naval War College in the Summer of 1903.

before you this year, I have accordingly, and after duly considering the matter, concluded to select for a brief discussion with you a few of the more practical matters: fragments from the chapter of the "Prevention of the infectious diseases," choosing as types some of those that occur most frequently on board ships and with which you will all be sure to meet sooner or later.

In the choice of this subject, I have been directly influenced by some recent experience which went far to again impress upon me the importance as well as the necessity of the *sympathetic coöperation* between the commanding officer of a ship or station and his sanitary advisor, the surgeon, as a primary condition for the successful prevention not only of the introduction and spread of an infectious disease on board a ship or in a navy yard, but also for the more general purpose of maintaining a high standard of health in these places under all conditions, among the men under command.

The particular experience referred to was gained during my service as medical officer on board the Prairie, which vessel was four times threatened with an invasion of measles during the first twelve months, since last going into commission and which, moreover, only narrowly escaped from an epidemic of diphtheria last spring while undergoing a few minor repairs at the Norfolk navy yard. I hope to demonstrate to you that the cutting short of these several epidemics of measles as well as her escape from the diphtheria were entirely due to the coöperative action above referred to.

1. *Measles on the Prairie.*—The Prairie received her first complement of 450 landsmen for training from the U. S. R. S. Franklin about the 29th of December, 1901, and started immediately from Hampton Roads for the Gulf of Paria. On the second day out, two cases of measles appeared; two weeks later, seven cases of measles were admitted; two weeks from that time, four more cases of measles occurred. After this, the epidemic stopped. It is clear that out of these thirteen cases of measles, eleven were contracted on board ship from the two that came to us from the Franklin; it is also clear that the disease was quite ready to spread in geometric proportions, had it been allowed to do so. The second and third times measles came on board, it was arrested each single time, remaining confined to one case which was promptly recognized and sent to a hospital. On November 7,

1902, two days after the Prairie had left Norfolk with 500 marines on board and while on her way to Culebra, one case of measles was admitted; just fourteen days later three more cases appeared, after which the disease was again stamped out.

The first epidemic, then, ran its course in the Gulf of Paria, the last in Great Harbor, Culebra. The second and third attempts at invasion were met so promptly that they did not assume the epidemic form. It will be seen that three out of the four cases constituting the last epidemic were contracted on board from the one taken on board in Norfolk, and that this epidemic showed its readiness to progress as did the first epidemic—if left to itself, it would have spread until every susceptible person had been converted into an immune against measles. The object of our expedition, however, was not the immunizing of the men against measles but that of converting landsmen into ordinary seamen and every other aim had to be made subordinate to this chief object.

Measles being one of the most contagious of infectious diseases, and most of the Prairie's 720 men being still of a susceptible age, namely between 18 and 20 years, it is conceivable that a serious epidemic of them, under circumstances so favorable to the development and spread of them as they were on board the Prairie, would mean the temporary conversion of a training ship for landsmen into a hospital for contagious fevers, to the great loss in time and expense to the government and the naval service as well. It was, therefore, also reasonable to assume that any lesson we might have learned from actual experience in the past, any help we might get which would be calculated in the future to aid us in intercepting the onset, limiting the spread or impeding the progress of a disease of this character in any way under similar circumstances, would prove welcome and useful.

Suffice it to say right here and without mentioning many details in which my commanding officer seconded every effort I was concerned in making for the arrest of the epidemic, that nothing that could be done by him was left undone.

The reason that the first epidemic extended to thirteen cases probably was that it found us quite unprepared, being without a steam disinfector. 450 boys, quite unused to the sea together with the rather sudden transference from their native climate in midwinter to the Gulf of Paria, seemed to develop without

warning all the weak points in their anatomy, so that the sick bay became crowded and *isolation* (as that is generally understood on land) of those affected with any contagious disease was hardly to be thought of, much less to be carried out as it should be.

After having constructed a temporary sterilizer, the general principles of procedure were about as follows: The patient with measles was taken into the sick bay, made to step on a clean white sheet on which he dropped all his clothes. From here he went into a bath-tub where soap and water and the brush were used to scrub every square inch of his surface, including the hairy scalp, while the clothes he had left were wrapped up and put aside temporarily for future steam sterilization; after a patient had been scrubbed, he received a bichloride bath and after this, he was wrapped in a white sheet soaked in bichloride solution and put to bed. Three bichloride baths (sponge baths) were given him daily during the entire time of his sickness, his mouth and nose were rinsed four or five times daily with weak disinfecting solutions and he was supplied with gauze handkerchiefs soaked in the same solution, which he was ordered to use when he was either coughing or sneezing. The reasons for everything that was done were thoroughly explained to him. Any ear trouble, throat trouble or conjunctivitis were at once taken in hand and treated accordingly and while he was still in bed.

These are, in brief, the leading points of our treatment; the average duration of the cases treated on board was 8.56 days, counting from the day of admission to the day of discharge to duty, which is very good indeed and compares most favorably with the statistics of the disease. (Best results ever attained in the navy.)

You will see that the leading features in our method of handling the patients consisted in that most of the attention was directed to the patient himself as constituting the chief source of the danger of the spread of the disease; isolation, as was mentioned before, was impossible or, at best, could only partially be carried out and partial isolation is worse than none. Notwithstanding that no precautions other than those just described, were taken against the spread of the measles from one man to another in the sick bay, a measles patient often lying in a bunk adjoining that of a patient sick with quite a different disease, we are positively certain that no case of measles occurred that could be

traced to any one of the patients after he had once been put under that treatment.

After a patient was well, his bichloride sheet was removed and he stepped into a clean and sterilized suit of clothes and at once went to duty.

Although I cannot go into details on the subject of an early diagnosis of the disease, I must, in fairness, mention the fact that without our having succeeded in establishing a diagnosis, on the average, two days before the eruption appeared, the number of cases would surely have been at least twice or three times as large, because it is known that patients attacked with this disease spread the contagion four or five days before the appearance of the eruption.

It is safe to say, even without referring to more accurate statistics on the matter, that measles, mumps, influenza, diphtheria and typhoid fever are the most common among the infectious diseases with which our ships are menaced, at least while cruising in home waters. All the receiving ships and naval stations had one or more epidemics. Some or all of these, usually, or of late years at any rate, have arrived on board the various receiving ships with the recruits sent there from all parts of the country by recruiting officers. Here, finding the conditions most favorable, they thrive and spread like bacteria in an incubator on a most favored medium and at the temperature optimum, before their existence is even suspected and the foundations for a long-continued and wide-spread epidemic are laid and must be the necessary consequence. The present receiving ships are generally over-crowded far beyond their allowable capacity and insanitary generally from various other reasons in addition (stagnant water); the number of medical officers on board is wholly inadequate, and the means at their disposal for combating such wholesale invasions wholly insufficient; hence their efforts are practically restricted to the sending of their patients to the hospital as they develop, which means, to a stage in the development of the epidemic when preventive measures are all but useless, because the germs of the disease are abroad and running wild, or, perhaps, are more carefully stored away in bags and hammocks, ready to be transferred to another ship whenever the time comes for a draft of men to be so shipped. Little wonder, therefore, that these receiving ships must be looked upon both as depots for the

collection of all sorts of contagious diseases from all parts of the United States and as centers for the distribution of these diseases to the cruising ships of the navy. They are the veriest incubators for all sorts of disease-producing germs. The first in line to receive them are, very naturally, the training ships and from these, in due time, unless thoroughly stamped out there, they are transferred to the ships of the squadron.

In this simple manner whole fleets have been known to be invaded and measles, more especially in the past, have dragged along for months in a semi-epidemic form on board most, if not all, the different vessels of a fleet, half measures against them being ineffectual. A quarantine of at least two weeks should, in the future, be imposed upon all newly-arrived recruits and proper disinfecting plants be established to take care of their persons and clothing before they are allowed to join those already present.

Although it is never safe to generalize, each infectious disease being a law unto itself, needing different methods of handling in accordance with the difference in the character of the infectious germ causing the same, it is perhaps safe to say that the above described method would meet most of the requirements in the cases of scarlatina, rubeola, variola, variolois, varicella and exanthematic fever. All these diseases form a distinct group of infectious fevers having some very essential characteristics in common. They are all characterized by a peculiar skin eruption; they are all distinctly contagious and leave a rather enduring immunity. The germs causing them are still unknown and, from what we know of them so far, they cannot belong to the class of bacteria. It is highly probable that these germs infect the human organism by way of the mouth, throat and nose; it is certain that they cannot live long outside the living body, although remaining virulent for some time. Hence it results that in all this group of diseases, the chief danger from infection lies, first, in the infected patient himself and only in the second place in the persons and things with which he has been brought into immediate contact. Hence, also, the efficacy of the treatment above described.

Diphtheria.—There is, perhaps, not a single one of the disease-producing germs that have been discovered within recent years, better known than is the bacillus causing diphtheria. We may

say that we know all about it except the chemical constitution of the poison which it produces and through which it effects all its mischief.

Being discovered by Klebs and Löffler just twenty years ago, Neisser has furnished us with a method of staining this bacillus by means of which we may sometimes diagnose a case of diphtheria even without the intervention of the usual culture, which latter delays the diagnosis at least 18 to 24 hours. By this method of double staining with methylene blue and Bismarck brown, we can stain the body of this little rod brown, and its ends a deep blue. Its favorite place is found in the mucous membranes, especially the human tonsils, where it forms a false grayish-white membrane and produces a poison which enters the blood, causing the disease; the bacillus rarely enters the blood-current bodily. The germ spreads most often from one individual to another. The opportunity is especially favorable, since the virulent germ resides often for months, even years, in the nose and throat of those who have been through an attack of this disease. Then again, experiments have shown that it remained virulent for a long time outside the human organism on the things that our patients have been in contact with. It is due to this particularly that the disease in some places remains epidemic the whole year round. We all know that, owing to the discovery of the antitoxin by Behring, diphtheria has lost most of its former death-dealing terror. Instead of our losing from 60 to 70 per cent of our diphtheria patients, as we did formerly, the timely and judicious use of this antitoxin has reduced this mortality to less than 10 per cent. When antitoxin is used on the first day of the disease, the death rate is from 1.07 to 2.7; when it is used on the second day, it has been found to be from 5.7 to 14.1 per cent; on the sixth day it rises to from 19.2 to 30.7 per cent.

Here there is a disease, one of the few of the infectious diseases against the ravages of which we can proceed with a specific remedy and ultimately cure it. In practical life, however, other conditions must be observed. Thus, diphtheria, having invaded a crowded ship, is still a very serious matter and one by no means to be taken lightly. Unless prompt and judicious measures are at once taken, diphtheria is as dangerous a disease as it ever was with all its former serious consequences. As is the case with every infectious disease, our means and methods of preventing

its spread must be based upon an exact knowledge of the characters of the germ that produces the peculiar disease, if we wish to make no mistake and be successful in our efforts against it.

Assuming that the disease has become prevalent on board a ship, the first and most important step to be taken is to get rid of the chief danger, that is the patients themselves, all that belongs to them and everything with which they have lived in contact. This is, of course, possible only when communication with the shore can be established, namely, in home ports. The only after isolation has reference to surrounding every patient with such an armor as was described in our treatment for measles; which shall effectually prevent the escape of germs from his body and which I should attempt to carry out if caught at sea and away from shore communications. This, of course, presupposes our ability to diagnose every case on hand. Knowing, moreover, that the germ lives in and can be spread by the healthy, a certain percentage of whom are always found to harbor the germs during an epidemic, especially in crowded places such as ships, these must be found and treated accordingly. It seems evident that nothing short of a bacteriological examination of the throats and noses of every man of the ship's company, without exception, can effect this end. While those having the disease are sent to a hospital or otherwise isolated, the suspects or those bearing the germs without showing the actual symptoms of the disease, must be temporarily quarantined in a special tent, or if that cannot be done, their throats and noses treated with weak disinfectant solutions, their clothes disinfected and all avoidable communication forbidden. Their mess gear must be kept separate from that of the rest. Those remaining on board in active duty must be kept under constant guard, every simple case of tonsillitis at once examined for bacteria and, if any are found, separated from the well and clean.

There is no time that can be called too soon when the injection of antitoxin is commenced; the sick as well as the sound must receive it. An ordinary preventive dose for the well is, of course, much smaller than that to be administered to the sick; one dose of 200 immunizing units is sufficient for the well and will surely prevent the disease. In the case of those already showing signs and symptoms of the disease, the number of units to be administered must depend upon the severity of the course

of the disease and be left to the judgment of the physician in any case—1000, 2000, 3000 units.

Of course, the old adage, of an ounce of prevention being better than a pound of cure, never shows itself as true as it does in the case of our struggles against the spread of an infectious disease. But it is just here, in these early attempts at keeping the disease away from his ship and at a time when the danger seems as yet far off to those unacquainted with the characters of disease-producing germs, that the surgeon meets with the greatest difficulties. Only too often, his suggestions and remonstrances are pronounced too severe, unreasonable and altogether impracticable and unnecessary. And yet they may mean just that ounce of prevention we have spoken of. During an epidemic, a certain number of cases of simple tonsillitis occurred on board the Prairie, due to streptococcus invasions. During that month we had between thirty and forty such cases. Daily examinations of the throats and noses, with the microscope for the diphtheritic bacilli were made and, in the doubtful cases, cultures were employed. Cultures of some cases were also sent to the hospital for the confirmation of our own examinations. I am now happy to state that of all the cases examined, not one case was discovered, in which the true bacillus of diphtheria was found and we had, by a careful and thorough quarantine, kept the disease out of the Prairie.

The time came when our repairs at the yard were completed and we were ready to receive 350 landsmen from the receiving ships. I had the assurance of Dr. Berryhill, who had been ordered there for the purpose of stamping out the epidemic and done excellent work, that the men we were to receive had satisfied all the requirements of people free from the disease, and we took them on board. Upon examining the newly-arrived lot of landsmen, three men were found among them who had not left the ship during the time measures for prevention had been taken. Neither had their persons ever been examined nor their package cleaned and disinfected. I recommended that they be returned at once. The commanding officer of the receiving ship refused to accept them unless on order from the commandant of the station could be obtained.

These three men broke the chain of the whole process of weeding out the well from the sick, the safe from the dangerous

ones. A thorough appreciation of the principles involved, of the absolute necessity of observing *all* the details in the process, in order to insure success and not to destroy all previous efforts, and waste all the expense involved so far, could not have permitted these three men to have come within ten yards of those put through the required process. This technical mistake, if allowed to prevail, would almost surely have resulted in transferring the disease to a healthy ship of 720 men, ready to start a fresh epidemic, with all the necessary consequences in its wake.

Fortunately, such an order from the commandant was produced, the three men were returned and the Prairie remained free from diphtheria in consequence.

Mumps.—Mumps is another of those infectious diseases that frequently visit ships and stay a long time and the causative agent of which remains as yet entirely unknown. The objection to mumps is that they drag along for months and years on board ships, especially when they are cruising in foreign waters, and single cases cannot be sent to a naval hospital the moment they occur. Although this disease is not of a dangerous character, beyond that the service loses a good many working days, it causes in one-third of the cases a permanent atrophy of either one or both testicles, resulting in sterility.

The germ, whether a protozoon or a bacterium has a special liking for the parotid and sometimes also the other salivary glands and causes them to swell up. The great tenacity of its epidemic character is most probably due to the long period of incubation, which is eighteen days; the disease itself lasting about ten days on the average.

The germ being unknown, it is of course impossible to say through what particular channels it leaves the infected persons, so that we are not exactly certain in what direction we are to direct our efforts at the prevention of the spread of the disease. But, knowing that the germs principally affect the salivary glands which discharge all their secretions into the cavity of the mouth, it is most likely that it will be there that the germs will some day be discovered when some one shall invent a method of staining that shall enable us to recognize them. To the expectoration, therefore, must be directed our principal efforts at preventing its spread. Indeed, the Italian naval surgeon, Belli, tells us that mumps on board the Varesi, an Italian second-class battleship,

did not cease to be epidemic until all the spittoons had been thoroughly disinfected and until a heavy penalty had been put upon the promiscuous spitting on the decks.

In this connection it certainly is interesting to read what Surgeon Charles F. Stokes has to say in his last report to the Surgeon General with regard to the cup at the scuttle-butt. He says:

"The importance of providing the ship's company with distilled water is now thoroughly established and appreciated, but the sanitary importance of the scuttle-butt cup appears to have been overlooked.

"This cup, as a disease spreader, is ideal. A member of the ship's company with an infective disease drinks at the scuttle-butt, leaving some of the secretions of his mouth, germ-laden, on the lip of the cup, and the next man, possibly awaiting his turn, gets an undiluted virulent culture of the organism from the outside and edge of the cup rim. On this ship the drinking cups in use by the men are kept submerged in a solution of formaldehyde (1-2500), and outbreaks of tonsillitis, mumps, grippe, etc., have been checked in this way."

I have for many years insisted upon frequent rinsing out of the mouth with weak disinfecting solutions and receiving all expectorated matters in antiseptic spittoons or into a bichloride handkerchief which was afterwards burned or thrown overboard. This treatment was strictly followed out on board the Prairie where we had two cases about a year ago, and to these two cases the epidemic remained confined and did not spread.

Here also, however, we must not underestimate the preventive value of an early diagnosis and consequent isolation of the patient. Owing to the long period of incubation peculiar to mumps, a man may, for twenty days, expectorate in every part of the ship and, adding to this a moist climate and a hot ship, all conditions under which any germ must flourish, a long continued epidemic may have been started before even the first case comes to be noted.

Tuberculosis.—The literature on tuberculosis is so vast and the cause of the disease so widely known that I shall confine myself to only a few remarks with regard to the most recent experiments made, with the object of showing that the expectoration of the tuberculous patient is the most frequent and effectual source of the transmission of the disease from one individual to another. It has been found by a number of the most painstaking experimenters in Germany that the spray, sent into the atmosphere during the acts of coughing and sneezing, sends the tubercle

bacilli not only in a direction right in front of the person coughing but likewise in the rear of him.

Observations as regards the time during which these fine little particles of spray, carrying the bacilli with them, remain afloat in the air, show that they are exceedingly light, since they have been found to remain suspended for hours.

It has recently been found, moreover, that tuberculosis is much more often transmitted through such spray than through the dried dust that rises into the atmosphere from sweeping. The spray is richer in the number and virulence of its germs than the dust collected in the rooms of tuberculous patients. Under normal conditions, the spray from a tuberculous patient while coughing in a room is carried a distance in front of him of about one meter; hence such a distance is considered as the danger zone. From these few facts alone, the means and methods that naturally suggest themselves as applicable to the prevention of the disease on board ship are self-evident. The crowded conditions under which the men are living on board ship, being rarely more than one meter apart whether they are working on deck or in the engine- or fire-room, or whether they are asleep in their hammocks, would seem to make it imperative to send tuberculous patients out of the ship as soon as they are so diagnosed.* This is not inhuman but rather as much to the interest of the patient himself as it is for the protection of the ship's company.

Fortunately, a diagnosis can readily be made and the tubercle bacillus is recognized under the microscope with the greatest of ease.

In this lecture, as you have seen, I have touched upon some of the more common domestic infectious diseases and the principles of their prevention; in my next lecture I shall take up the two most important tropical types of disease, namely: malaria and yellow fever.

LECTURE II.

Malaria.—There is perhaps no known infectious disease that has received so much attention of late as has malaria. The whole history of medicine knows no parallel. Upwards of 5000 books, monographs and pamphlets have, within the last three years, been

* If this cannot be done, everything must be done to prevent the spray formed in coughing to leave the patient in an actively poisonous form.

published on malaria alone, not to speak of the large number of government reports, not in the open market, that have been made by a large number of commissions, sent out to all parts of the tropical world by the governments of Europe, with the object of investigating this disease and, if possible, of devising means for its extermination. This wide-spread attack upon malaria has been caused less by motives of humanity than by the interests of European nations in the colonization and civilization of those rich tropical countries. The object of making these countries give up their treasures, or cause them to yield agricultural products of still more value and use to the civilized world, than gold and other minerals, it seems, can never be attained unless it can be shown that malaria can be stamped out. The very question of the existence and of the permanent settlement of the white man in these tropical climes seems, at present, to revolve around the question of the exterminability of malarial disease.

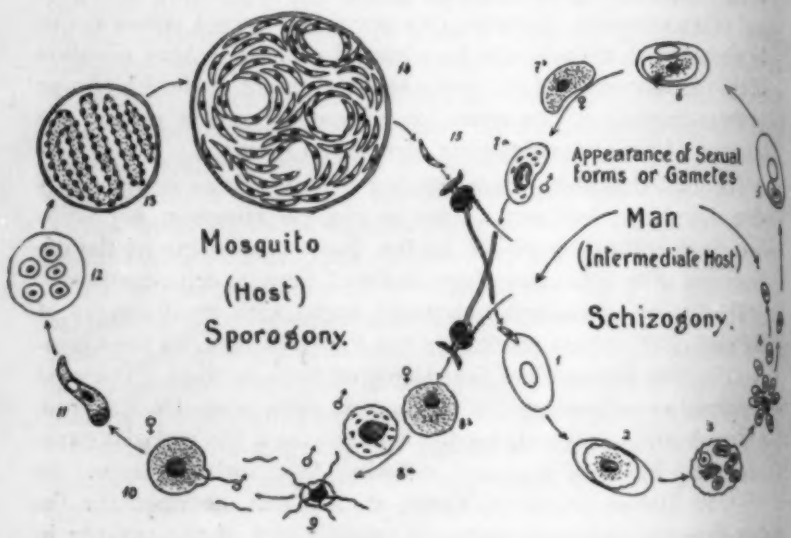
The United States, besides having malaria within its own borders, has large interests vested in tropical climates; her ships have frequently been visited by the disease and many of the officers and men in the navy have suffered from its consequences.

The history of malaria practically began with the discovery of the medicinal virtues resident in the Peruvian bark, by the Countess Cinchon, then wife of the viceroy of Peru, in 1640. The next important event occurred in November, 1880, when Dr. Laveran, a French army surgeon, for the first time saw the malarial parasite in the blood of a patient suffering from malarial fever. In 1885, an Italian physician, Golgi, studied and described for the first time the different stages of development of the parasite in human blood. In 1898, the English army surgeon, Ross, proved the transmissibility of the malarial parasite through the mosquito, and since that time a whole army corps of investigators have contributed many valuable facts regarding malaria, its cure and prevention. These are, briefly stated, the most important events in the history of malaria.

The fact that, during the last International Medical Congress at Madrid, a unanimous vote of thanks was telegraphed to Laveran, Baccelli, Koch, Ross, Manson and Grassi, must be considered as proof sufficient that the discoveries of these men regarding malaria have met with the most general and world-wide acceptance and recognition.

The peculiar parasite which, when it finds entrance into the human organism, causes what is known as malaria or intermittent fever, is a protozoon, resembling in its characters those forming the class of coccidia. The malarial parasite, however, differs from the family of the coccidia, in that it is parasitic from the start and lives exclusively on the red blood-corpuscles, while the coccidia are parasitic only to epithelial cells.

The parasite passes through two different forms of development; one in human blood (endogenous) and another within the body of the Anopheles mosquito (exogenous). Since a knowl-



edge of these two developmental cycles will greatly assist in an intelligent appreciation of the epidemiology of malaria, we will follow the parasite step by step with the aid of the figures on the adjoining plate. Fig. 1 shows a red blood-corpuscle into which one of the parasites is boring its way, having been put there by the proboscis of a mosquito; Fig. 2 shows that the parasite has grown at the expense of the blood-cell; in Fig. 3 we notice that the parasite has divided into a number of small parasites, still within the blood-cell; in Fig. 4 the blood-cell has been destroyed, the small parasites have been set free. Two ways are now open for the parasites to pursue: one is that they reënter a blood-cell and repeat the same development over again; another is that they

develop into sexual forms as shown in Figs. 5, 6, 7b and 7a. Fig. 7b shows a female parasite, and Fig. 7a a male parasite. So far the development is called asexual or schizogonic, man being only the intermediate host of the parasite, not the real one. If now some of the blood, containing these sexual forms, gets into the stomach of the mosquito, the further development of these forms is completed; Fig. 8b shows a completely developed female parasite, while 8a shows a male parasite in the same advanced stage of development. In Fig. 9 we see the spermatozoa leaving the male parasite and making for the female parasite, shown in Fig. 10. Fig. 11 shows the parasite in the worm-like stage in which it bores its way through the coat of the stomach and becomes encysted just beneath its peritoneal covering. Here begins the spore-formation (13) which is continued into the development of the final sickle-shaped parasites (14) which burst the capsule, drop into the body-fluids of the mosquito and thus find their way into the proboscis or stinger of the insect and thence again into the blood of man. This last form of development is the sexual or sporogonic form of development of the malarial parasite. These two forms of development must alternate with one another, if the parasite is to continue to flourish. The schizogonic development is limited and must ultimately end with the death of the parasite unless complemented by the sporogonic form of development. It has, however, quite recently been discovered that the arrested form of the parasite in human blood (Figs. 5 and 6), called gamete, may revert to the schizogonic form of development under certain conditions, and this is really what occurs when malarial attacks recur without actual infection by fresh infected mosquitoes. The morphological proof of this has recently been furnished us by Schaudinn.

Human malarial parasites are at present classified into two distinct varieties:

1. *Large* Parasites, divided into:
   a. The tertian (Hæmamœba vivax.)
   b. The quartan (" Laverani.)
2. The *small* ring-shaped parasites, which have received many different names.*

*This classification and some of the succeeding facts as regards malaria have been borrowed from "Einführung in das Studium d. Malariakrankheiten," by Dr. Reinhold Ruge, Marine-oberstabarzt, 1. kl., Berlin.

1. The large parasites: a. Tertian.

If you take a drop of blood from a malarial patient during the time the temperature is going down and put it under a good microscope, you will find in or upon the surface of the red blood-corpuscles the earliest or youngest as well as the smallest forms of the tertian parasites. In size they are about one-sixth the diameter of the red blood-corpuscle. If you will stain a thin film of such blood on a thin cover-glass, you will see small rings, the outlines of which are stained sky-blue, with a blood-red, compact, little spot in some part of the ring, looking in fact like a seal ring. Twenty-four hours after the chill, these rings will be found much larger and show small, black masses of pigment in the center. Often, the parasite will not assume the ring shape, looking more like an amœba that had become solidified the moment it had just stretched out its numerous arms.

Thirty-six hours after the chill, not a single ring-form is to be seen; the parasites, which now nearly, but not quite, fill the entire red corpuscle, appear as blue discs containing lots of pigment. The red corpuscles are now twice their normal size and have become very pale.

At last, just before the next chill is due, the parasites show signs of division or sporulation. The corpuscle, now entirely filled with these spore-like organisms, suddenly bursts, setting them free. They now are ready and in a condition to invade fresh blood corpuscles, while the black pigment is swallowed up by the white corpuscles. These forms that have been mentioned so far are the asexual forms or schizonts.

After a patient has had several attacks of fever there are in the blood certain other forms of parasites, in which the pigment is scattered uniformly through the entire disc. They either fill out the entire corpuscle or are free. No signs of division are seen. These are the spheres or gametes. A patient may have these in his blood for many days and no chill need occur. (Occasionally dumb chills are complained of.)

The *Quartan Parasite* is distinguished from the tertian in that it never exceeds the size of the red corpuscle, and the blood corpuscle itself is never enlarged nor loses its normal color. The development is similar to that of the tertian, only it lasts seventy-two instead of forty-eight hours; it is less stormy than the tertian.

3. The small parasites of *Tropical Malaria.*

These appear different from either the Benign Tertian or the Quartan. The blood, during the time the fever is at its height, just shows the smallest and finest rings, so sharp that they look as if drawn with a pen. Their diameter is about one-fifth that of a red blood-corpuscle. These are called the small tropical rings. They grow larger as they grow older, but even the largest never attain more than one-third the diameter of red blood-corpuscle. There are other characteristics by which the tropical parasites can be distinguished from the large parasites, but these we need not go into in this connection. Suffice it to say that we can, with some practice, easily distinguish these three different forms of parasites. (Marines at San Juan.) *

The mere *idea* that mosquitoes could transfer malaria is not new. It had been frequently brought forward, but no one had been able to prove it. It was in 1897 when Ross succeeded in cultivating, as it were, the human parasite in the bodies of certain species of mosquito. In 1898, he, moreover, succeeded in transferring the disease to healthy birds, thus completing the entire circle of proof. Every investigator has since confirmed Ross's researches. The fact that the Anopheles mosquito is the only species of mosquito so far discovered that transmits human malaria, was established by Koch. Bird malaria—due to Halteridium and Proteosoma—is harmless to men.

A few remarks on these two kinds of mosquito, the common culex and the anopheles, would seem necessary, in order the better to understand the principles involved in their destruction, which latter forms one of the chief methods of attack against the disease.

These differences, indeed, begin very early, namely, with the laying of the eggs. While the culecidæ lay their eggs in little heaps upon the water, the anopheles lay theirs more in the form of a thin film. The larvæ of the culicidæ hang vertically from the surface, head down, while the larvæ of the anopheles have their bodies parallel to the surface of the water.

The anopheles larvæ prefer small pools of water containing an abundance of algæ, well protected from the wind and situated in shady places. The culex larva is less particular in this respect, and any little pool of water anywhere, tin cans, barrels, the bot-

* See Surg. Gen. Report for 1903, p. 279.

toms of small boats, will satisfy her. Running water is free from larvæ. The larva becomes the pupa, also living in the water, and from the pupa the winged insect is finally developed.

The female of the culex is easily distinguished by the small head and its long stinger. This is usually kept covered by a sheath; on either side of the stinger, a hollow needle, are the two very short palps, and outside of these are the antennæ or feelers. The thorax is connected with the head by a thin neck, and is succeeded by the worm-like body. The two wings show very intricate venations which are used to distinguish the different species and varieties.

The gunus anopheles is distinguished from the culex by the palps, which are nearly as long as the stinger in both sexes. The male has feathered antennæ.

You can at once distinguish a culex from an anopheles by the position which they assume on the wall. The body of the culex is nearly parallel with the surface of the wall, while the body of the anopheles forms an angle of 145° to the surface. A few facts about them are:

I. The females alone suck blood, the males live on a vegetable diet.

II. They are night wanderers.

III. During the day they hide in the grass, on the under surface of leaves or in the bark of trees, protected from wind.

IV. Fertilized females hibernate in towns and come out in February or March. The males die. The females prefer human habitations and suck blood as soon as they can, for only after they have done so do they develop their fertilized eggs.

V. Females do not die, as is commonly thought, after sucking blood but live on to go through that process several times.

The examination of the mosquitoes, the work of dissecting out the salivary gland and looking for the germs is a tedious and very delicate sort of work which we need not go into.

EPIDEMIOLOGY.—The cause of malaria had previously been placed in the soil, because turning over the soil had always been followed by an increased morbidity. When it was shown that the soil theory did not explain half the facts connected with the epi-

demiology of the disease, it was located in the water; this theory also proved only half right, explained only a few known facts.

Now the question is, does the mosquito theory agree with all the facts known with regard to the epidemiology of malaria?

When we go through it, item by item, you will see that the mosquito theory agrees with everything connected with malaria, and leaves absolutely nothing unexplained.

1. It had long been known that malarial fevers appeared about twenty-one days after a temperature maximum had been reached that did not sink below 24° C., 75° F. in the houses. The anopheles must be kept steadily at that temperature if the malarial germ is expected to develop in them. If we allow ten days for the development of the parasite in the body of the mosquito and ten to eleven days for the period of incubation, the appearance of malaria, twenty-one days after the temperature maximum has appeared, is sufficiently explained. The rapidity of the development, however, is known to depend on the temperature, and can be accomplished in less time if it is higher; at 27° C. the development of the malaria germ in the body of the mosquito is completed in nine days and the remainder of the latent period is filled out by the period of incubation.

2. Malarial infection occurs for the most part during the night. The anopheles is a night wanderer and stings during the day only when stirred up in its hiding place.

3. Malaria is a disease of the country, and not so much of cities, because the anopheles finds no breeding places in cities and plenty of them in the open country.

4. Continued building and cultivating a soil gradually lead to the extinction of malaria, because they deprive the anopheles of its breeding places.

5. Merely turning over the soil always is succeeded by malarial disease. The anopheles leaves its place of hiding and stings the laborer; new pools are created in which they deposit their eggs, from which within 12 days new mosquitoes develop.

6. When in northern countries malarial fevers have decreased, it is principally to be attributed to the judicious administration of quinine. The parasites being killed, the mosquitoes were unable to infect themselves.

Men on board ship—provided the ship is anchored a certain distance from the shore—suffer much less from malarial infection

as long as they remain on board than the people on land, because the anopheles does not fly great distances and only a few specimens are but occasionally found on board. The flight of the anopheles, the farthest ever known, is 5 km., or 2.2 miles.

Another fact is for the first time well explained, namely: in the tropics it is the transitional periods, both between the dry and the wet season as well as between the wet and the dry season, which always mark the greatest malarial development. It is the small and infrequent rains which cause many small pools in which the mosquito larvæ can complete their development before they are disturbed; while frequent and large rains flood and destroy their breeding places.

We know, moreover, while the anopheles stings all the year around it does not infect all the year around. During the time it is non-infectious, the malaria germ is not developed on account of the absence of the proper temperature. In the spring when it becomes infected and finds the conditions more favorable, the germs develop and then the mosquitoes carry the disease.

Hence the recommendation of R. Koch to kill the germs that are in the blood of those suffering from chronic malaria before the time mosquites become plenty, and thus break the chain of communication by systematic administration of quinine.

PREVENTION OF MALARIA. *a. Personal.*—The chief aim of the personal prevention of malaria consists in taking preventive doses of quinine before infection is carried so far as to bring on an attack of the fever.*

Dr. Robert Koch recently, during his travels in the tropics, has interested himself in this problem and has come to the conclusion that quinine in a single dose cannot be relied upon to prevent malaria. He found, on the contrary, that two doses on successive days were necessary to do that. His rule is to give fifteen grains

* This practice was first introduced in the year 1717, by the Duke of Bonneval, acting under the influence of his medical adviser, during the siege of Belgrade. Bonneval and all his servants took quinine and remained well. Nothing is mentioned with regard to the dose they took. A more accurate account is found toward the end of the 18th century in the reports of the English naval surgeon, Lind. He proposed that those of the ship's company who had to spend the night on shore in tropical climates should take ten grains of quinine daily. Quinine, however, on account of the small doses in which it was taken, lost a good deal of the confidence which it enjoyed under larger doses.

of the drug every tenth *and* eleventh day in the morning; in case of fever occurring in spite of this, he either increases the dose to 1.5 grams or gives the same dose every ninth and tenth day. As a rule, the stomach bears such a dose without disturbance.

Another method was employed by Plehn in East Africa: Seven grains of quinine were given every fifth and sixth day, instead of, as had been proposed by Koch, fifteen grains every tenth and eleventh day. This plan, in almost everyone's hands, has failed to prevent the fever, in spite of the fact that the total amount of the drug administered was the same, although given at more frequent intervals. The taking of quinine in the above prophylactic doses seems to be the only means so far known by which the fever is prevented. Such doses must be given to those who have had the fever, no matter whether it was the tropical form or the more benign northern type of the disease, if they are to have no return of the trouble. Even if patients return to a northern climate, this preventive dose of quinine given every nine and ten days must be continued for at least three months if returns of chills are to be prevented.

Every other means that has been employed for the prevention of the fever, when compared in its effects to those of quinine, is of minor importance and of secondary value.

Next to quinine, the mosquito net is coming more and more to the front, not alone because it prevents infection but also because an undisturbed sleep in the tropics is of much greater importance than it is in a temperate climate. Fires in front of the tent during the night are also very effectual in attracting and finally burning the mosquitoes.

Mosquito-proof houses in the tropics are still in the experimental stage. Their usefulness is undoubted but the practical requirements on man, to expose himself, even after sundown, to the stings of mosquitoes, render these houses of no use, after the men living in them have thus become infected. All houses in the tropics offer to the mosquitoes hiding places, and of the mosquitoes found in the houses of the natives especially, 50% are found to be infected with the malarial germs, while of those in the open air but 5% are malarial. These native huts form, therefore, the greatest danger to the white man; hence their quarters are built preferably away from native habitations. The best and

safest *personal* prophylaxis, therefore, remains the administration of quinine in proper doses and at proper time intervals.

a. General prophylaxis.—The belief was entertained that malaria could be prevented by the extermination of the mosquito. If this will be found possible, malarial fever, undoubtedly, must some day disappear. So far, however, this possibility must be doubted. Both the attacks upon the full-grown mosquito and those made upon its larvæ have had but temporary results.

Petroleum and lime have been put into the small pools of water in marshy districts of Africa every other day for a period of three months, and the effect produced within a limited geographical area, though quite perceptible, was but temporary.

Since, as we have seen, neither the generalization of the personal quinine prophylaxis in tropical countries, nor the attempts at the destruction of the mosquito on a large scale, have been absolutely and invariably successful in ridding a country of malarial disease, Koch has proposed a new plan of campaign. R. Koch assumes that malaria, like the plague and cholera and diphtheria, could only be successfully attacked by a careful search after light cases, such as do not usually come to the notice of the physician and pass on, spreading the disease unobserved, while themselves showing no symptoms of it. These light cases must be found and cured if the work is to be thorough. This principle was strictly carried out by Koch in Stephansort, New Guinea. A systematic blood examination of all the inhabitants of the place was made and all the cases proving of malarious nature, showed the parasites in their blood, and were treated with quinine. In this manner he succeeded in rendering the place absolutely free from malaria, and at the same time, all the recurrent cases were thus prevented. Koch's plan was strictly carried out during the building of docks in Wilhelmshafen, Germany, in 1901. Dr Martini, staff surgeon in His Majesty's Navy, reports to the German Colonial Congress in 1902 that, owing to this method of procedure, the morbidity due to malaria had been quickly reduced from 200% to 0.5%; a most excellent result, showing not only what can be done by this method but also the unceasing search for malarial germs that must have been made in order to accomplish it. These are, indeed, the best results with which the prophylaxis of malarial fever has ever been attended, and these principles of prevention would no doubt be adopted and strictly carried out on a

large scale in case the United States should ever build the canal on the Isthmus or at Nicaragua. The success of the plan will depend much more on the thoroughness with which it is done than upon the plan itself. Mosquito-proof tents will always be used. This plan of making frequent blood examinations, administering prophylactic doses of quinine on the slightest suspicion, was also carried out on board the Prairie while in Culebra, so far as the ship's company was concerned, and no fresh case developed, although our ship was anchored well within the zone of flight of the small anopheles mosquito. The only cases that did occur were in three officers to whom prophylactic doses of quinine had not been administered, nor had blood examinations been made. These were all recurrent cases and not due to fresh infection contracted at Culebra.

Yellow Fever.—It seems but a very short time since we stood in helpless ignorance facing the question of the prevention and spread of this dreaded disease. The numerous attempts that had been made by Sternberg, Sanarelli and others to discover the yellow fever germ had all been inconclusive. This germ still remains to be discovered. About twenty years ago, the idea that yellow fever was spread by the mosquito had been expressed by Dr. Carlos Finlay; it had, however, remained unproven.

In 1900, by a very carefully planned series of experiments by Drs. Reed and Carroll, it was shown for the first time conclusively that yellow fever was spread by the mosquito. These experiments were so planned and carried out with such scientific accuracy that the results attained proved absolutely convincing, and there is now no longer any doubt as to the correctness of the conclusions reached by these experimenters. The experiments were practically repeated and confirmed in toto by an English commission, sent to Brazil from the School of Tropical Medicine at Liverpool, consisting of Drs. Durham and Meyers, the latter dying of the disease, the former contracting it without dying, during the experiments they were making at Para.

During the American occupation of Cuba, the following precautions were taken for the suppression of yellow fever in Havana: as soon as a yellow fever case was reported, the house in which it had occurred was placed under quarantine. Reliable guards were placed around it, whose duty it was to see that no one but the attending physicians were allowed to pass in or out.

When, in 1901, the theory, that yellow fever was carried by the mosquito alone, was proven by Dr. Reed and accepted by the Board of Health, the method of procedure against the spread of the disease was modified as follows: The infected house was covered in by canvas, at public expense, every crevice was caulked in order that no mosquito should have a chance either to escape or to enter the place. After the patient had either recovered or died, the house was fumigated by the burning of insect powder; the clothes were left untouched. Since the germ could only be conveyed through the stings of the living mosquito, it was, of course, furthermore to be assumed that it could not exist outside either the human body or that of the mosquito; its very existence was made conditional upon this, hence the clothes and other things that yellow fever patients had come in contact with must be harmless, in accordance with the newly accepted theory, and this indeed proved to be the case.

Since it was found, upon further investigation, that almost all the small towns of Cuba were infected and that they were a constant danger to the city of Havana from immigration, all the physicians of these towns were ordered to notify the sanitary authorities of Havana by telegraph in case any one left there for Havana and to give their names. On the arrival of such a person at Havana, his place of residence during his stay was noted by the official who had met the man. A physician visited the house once in twenty-four hours, examining the suspect as to his temperature. In case he was not there at the appointed time and could not be found, a mild punishment was administered. This seemed to be sufficient to ensure good results.

The success of these measures was surprisingly good. Up to the end of the first year, 1250 non-immunes had been reported; of this number, the fever was almost at once discovered in twenty-seven cases. From May until July, for the first time in 150 years, Havana remained free from yellow fever. This was certainly a most unexpected and surprisingly good result in a city of 275,000 inhabitants and which was considered as thoroughly and permanently infected. The very success which had attended these preventive measures, all based upon the mosquito theory of yellow fever and carried out in strict accordance with its provisions furnishes the long missing link in the chain of proof. It may now be taken as sufficiently well established to

serve as a working basis for all future attempts at the prevention of the spread and propagation of yellow fever.

The methods of both the propagation and the prevention of yellow fever are so similar to those of malarial fevers that there can scarcely be any doubt left of the fact that its germ, which will before long be discovered, will prove to be a protozoon, similar to the germ of malaria, and not a bacterium. The principles of the prevention of yellow fever on board ship, therefore, are, as a consequence, almost identical with those that are followed out in the case of the malarial fevers, except we have as yet no specific like quinine for yellow fever. We must, in some way, break the double cycle necessary for the development in the mosquito of both malaria and yellow fever germs, to prevent a successful infection of man by the fully developed germ.

How tenaciously yellow fever sometimes clings to ships, you all know from your own experience. Ships have been kept at freezing temperatures a whole winter; they have, in addition been repeatedly—and according to reports—*thoroughly* disinfected, and yet yellow fever has continued in them undiminished. Recently it has been proposed to burn pyrethrum powder in ships infected with yellow fever, because the fumes of this powder render the mosquito senseless. It falls on the deck, stunned, and, before it recovers, is swept up and killed. But whoever has once tried to find and catch the small stegomyia, has also found out that it hides in the most impossible places; so that it might be asked: what becomes of those mosquitoes which are in hiding during the process of such fumigation and which do not fall on deck; (Mense)* do they not recover and go on with their work?

Mosquitoes prefer to hide during the day in dark and poorly ventilated places like the orlop, which is an ideal breeding place for them, and many cases of mild forms of yellow fever have occurred in men sleeping in the orlop of an infected ship, or some other place excluded from the general ventilating system. The diagnosis in many instances has either been wrong or, for reasons of convenience, the truth about it has been known and intentionally suppressed. A most pernicious practice.

The disinfection of a ship infected with yellow fever, to deserve the adjective "thorough" must kill *every one* of the mos-

*Mense, Arch. f. Schiffs' u. Trop. Hygiene.

quitoes present anywhere in that ship. The stegomyia being a night wanderer, such disinfection at any rate had better be undertaken during the night or at a time when it is not in hiding.

As an example of day-disinfection and the inefficiency of it, the following most recent instance may be quoted: A steamer arrived in New York from Progreso after a six weeks' passage with a yellow fever patient on board. The patient died in the harbor, and—so the report says—the ship was *thoroughly* disinfected. Apparently clean, the steamer proceeded from New York to Jacksonville. The captain's wife took sick on the way and died at Jacksonville. The ship left for Santiago, and, during a voyage of six days, three more cases developed, of whom one man died. At Santiago the whole ship's company was landed and sent to a hospital where eight more cases occurred. The stegomyia would have completed its deadly work by killing everyone on board had it been allowed to do so, in spite of the last thorough disinfection at New York.

In my opinion, any mention of this most important and now most generally accepted result regarding yellow fever, its causation by infected mosquitoes and methods of prevention by Drs. Reed, Carroll, Agramonte, Lazear and Major Gorgas of the army, without its referring to the coöperative support which these medical men received from General Wood in every way within his power, would indeed be ungrateful as well as incomplete. The magnitude and far-reaching importance of the discovery, its everlasting benefits to mankind, coupled with the fact that it would not and could not have been accomplished without the moral, physical and financial support and the intelligent coöperation of the then Commanding General of Cuba, entitles him to a large share of the credit in this great achievement.

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THE MOVABLE BASE.

By CIVIL ENGINEER A. C. CUNNINGHAM, U. S. Navy.

The popular conception of a modern navy is an aggregation of fighting vessels varying from the small torpedo boat to the great battle ship. The speed, armament and general efficiency of these vessels have the attention of the general public, and their *personnel* is a matter of keen interest and deserved pride, in our own country at all events. Beyond these points the general interest and information rapidly wane, which is but natural and to be expected. How a ship is built, equipped, and kept efficient is so largely a matter of technicalities that it is outside the interest of the public at large, and not the least reason for this lack of interest in technicalities, in the United States, at least, is that the history of our navy from its beginning to the present time is a record of unbroken successes in the various emergencies through which it has passed. There have been times when its ships have become antiquated in type and reduced in numbers almost to obliteration, but the spirit, tenacity and ability of its *personnel* have never failed or lagged even under the greatest discouragement.

When comparisons are made of navies they are generally based on tonnage displacements, armaments and types of vessels without regard to the means of maintaining their efficiency and effectiveness at all times and under all conditions.

The most efficient fighting ship is the one that is in the most perfect condition as to hull, machinery, armament and equipment; which has fuel bunkers full, a complete supply of ammunition, and whose officers and men are well trained and disciplined and in the best of health and spirits. How long can a ship remain in

this perfect condition? The fuel supply begins to diminish from the time of putting to sea; if it is in time of peace the trip is so laid out that fuel can be renewed at certain ports of supply, but in time of war this one question of fuel alone may greatly limit the radius of action. If at rest the bottom is becoming foul and deteriorating, and the ship is constantly becoming less capable of making speed at any time. The stress of a chase or the severity of an engagement may render repairs to machinery very necessary, or a fresh supply of ammunition imperative, even in the event of a ship not having suffered other injury or loss. The strain, both mental and physical, is much greater on officers and men in time of war and without estimating on the possibilities of epidemics, it is likely that the *personnel* of a war vessel may need partial renewal more frequently during war than in peace.

It is not necessary to follow this line farther to show how dependent a navy is upon its dock yards and supply stations, not only for its efficiency but for its continued existence, and more especially in war than in peace.

The policy of the United States has always been defensive, particularly of its own rights and broadly of sound principles. While it remained a continental country its dock yards and stations must necessarily be on the continent, and from them all naval defense would start. The acquirement of insular possessions renders the continental dock yards and stations, alone, insufficient for naval defense, for no extensive operation or supervision can be conducted without a convenient base of repair and supply.

The extent of naval operations depends upon how long a ship may remain away from a base of supply and repair and still be efficient, or how far it may leave such base with reasonable chance of return. When active defense becomes necessary the regular bases of a navy may prove inconveniently remote for its operation to the best advantage. It then becomes desirable to establish a base at or near the scene of operations, but this may be in hostile territory or in a country where a permanent base would be valueless when the emergency had passed; moreover, an efficient permanent base requires years in building, as its basis is the dry dock, which is the one thing which cannot be extemporized, and without which no ship can be maintained in perfect condition.

In defensive naval warfare we cannot choose the points where we will be attacked, but we can safely predict that they will be where we are the least defended, and where our ships are the most likely to be met in the least state of efficiency. Such points are matters of common knowledge to the world, and whether their attack result in the defeat of a fleet or the destruction of a city the result is equally disastrous.

These conditions and possibilities suggest a movable base which can be taken to the scene of operations, and which should supply all of the essentials of a completely fitted base of the permanent type. Even the movable base does not supply all that is desirable for modern operations, for, as far as possible, the greatest efficiency is secured when necessities are taken to the fighting ship and it is not compelled to go for them. To secure this last desirable condition, the movable base should consist of units each of which, where possible, should farther constitute a flying sub-base which can search employment when not operating directly with the movable base, or when more urgently needed elsewhere.

FLOATING DRY DOCKS.

The essential element of a movable or temporary base exists in the floating dry dock, but until Spain sent such a dock to Havana, it may be said to have been a dormant military idea. That dock was intended for war ships, and the existing conditions at the time the dock was installed rendered the fact of unusual significance. The failure of the dock to pass its tests, and its various mishaps of accidental sinking and failure of machinery, partly through mismanagement and partly from too economical designing, tended to mask the true value of these structures, and obscured the importance of the manœuvre of towing the dock from England to Cuba. This unfortunate dock was finally broken almost completely in two while being self-docked, and had this accident happened before the United States had taken the initiative with this class of structures for war purposes, it is difficult to predict how many years might have elapsed before a complete movable base would have been possible.

The United States was the first country to provide itself with a thoroughly modern floating dry dock suitable for military purposes, but was so closely followed by Great Britain with her new Bermuda floating dock that no great advance can be claimed in

inaugurating a new possibility in naval warfare. Neither was the full military possibility of the American dock generally recognized when it was provided, as it was intended for installation in the Mississippi River at New Orleans where land dry docks had been considered practically impossible of construction, and thus the primary cause of its existence was topographical and not strategic.

The full significance of a military floating dock was first realized when the United States recently provided for such a structure for the Philippines. The New Orleans dock had just proved a successful experiment; it was of British design but built under a general specification of the Bureau of Yards and Docks, and while it performed much more than was required, not the least important thing learned during its construction and testing was that more should be demanded of these structures than had hitherto been the case. At this time the establishment of a naval base in the Philippines was one of the most urgent problems confronting the nation; one demanding the utmost care and not possible of quick execution, even were the solution readily apparent. The floating dock happily relieved the situation; the essential of a naval base was provided, and if one location did not prove satisfactory another could be found. Profiting by the experience gained with the New Orleans dock the requirements for the Philippine structure have been made more exacting and comprehensive than has ever been the case with any previous floating dock in the world. The requirements demanded of it are so far in advance of those demanded of the New Orleans dock that its success is assured in advance. Structures of this class have been towed across the Atlantic Ocean and the North Sea and their seaworthiness has been fully demonstrated, but the towing of the Philippine dock half way around the world will be the final demonstration of the mobility of these structures, and will be a naval manœuvre of the greatest interest to all nations.

Considered as the basis of a movable base, the possibilities of the floating dry dock are yet far from being fully developed. By increasing the width of its side walls extensive shops may be installed on the dock itself and other desirable installations may be made, while the increase in side wall width also permits the installation of traveling cranes capable of handling the heaviest machinery and armament.

Repairs and preservation of war ships are too often considered from a peace basis alone; from such a basis the land dry dock has many attractions, but as a war tool the advantage is with the floating dock. We are rapidly nearing the draft of ships which requires a depth for land dry docks that renders them enormously costly, very difficult and slow of construction, more liable to failure from increased hydrostatic pressure, and in which no excess of depth is provided for emergencies. In time of war we may expect to deal with ships that are badly listed, down by the head or stern, or at an abnormal draft from injuries, and it is in such cases that the floating dock shows its superiority. It can readily be constructed for any possible emergency draft at slight increase of cost, and can be listed and depressed by the head or stern to take in a wounded ship that it might be impossible to enter in any land dock that we have under construction or projected. Sufficient depth of water is essential for the operation of a floating dock, and in maximum cases it must be from fifty to sixty feet and should be comparatively smooth, though a strong current is not objectionable. A ship once in the dock, however, it may be towed into a sheltered position which the ship alone could never reach, as these docks only draw from sixteen to eighteen feet with their full load.

In the development of the military floating dock it is entirely practicable to equip them with a hydaulic dredging apparatus with which they can make their required depth of water without seeking it, and by arranging the dock pumps to discharge under the bottom of the dock in suitable places, the dredged site can be constantly maintained, or even made without other aid, in a soft or sandy bottom. The hydraulic dredging apparatus installed on a floating dock may be of farther strategic value for improving the entrance to harbors, or even obstructing them, if advisable.

As the basis of a movable base the floating dry dock is the unit which will give the most anxiety when moved during time of war. Its progress in towing from point to point must be slow, and unless strongly convoyed it invites capture or destruction by an enemy. This danger may be reduced to a minimum by using the dock composed of complete and independent sections which are strongly connected into one unit when in use, but which are separable into sections for self-docking and other purposes; when separated into sections each one may be towed by a different

route and at a different time. If the number of sections is in excess of the maximum requirements, the loss or capture of one is not serious, and the gain to an enemy is practically nothing. In any event the towing of a dry dock can be made an invitation to battle that, if accepted, might culminate a naval war.

REPAIR SHIPS.

Another unit of the movable base is the repair ship. The equipment of the floating dry dock as a repair shop in no way curtails the usefulness of the repair ship, but rather increases its radius of useful action by leaving it free to attend to such ships as do not need actual docking.

The repair ship should be as completely fitted out for a repair shop as it is possible to so do with a floating structure, and the equipment may readily be carried to shears, punches, and steam hammers. A varied assortment of repair material should be carried in abundance, and artisans should largely constitute the crew.

The duty of the repair ship is to put in order the vessel that does not actually need to be dry docked for relief, and the majority of external and internal injuries above the water line may be made good by this ship. When the temporary base has been established the repair ship goes from vessel to vessel needing its services, transferring artisans and materials for such repairs as can be made on board the injured ship itself, and in the meantime, fabricating such material as requires its more extensive equipment and preparing it for transfer and installation at such time as it becomes ready.

These are the duties of the repair ship as a unit of the movable base, but it should still farther constitute a flying sub-base capable of searching a cruising ground for vessels in need of its services, and to this end should have speed equal to any vessel of the fleet. Such speed not only insures prompt service in time of need, but enables the repair ship to accompany a fleet without decreasing the efficiency, and permits it to cruise in time of war with the least danger of capture.

If a vessel is found by the repair ship to be in too serious a condition to be promptly and effectively benefited by its services, it may serve to tow the disabled vessel to the floating dry dock where repairs can be made to better advantage, and the repair

ship thus left free to carry its services where they will be of greater advantage.

COLLIERS.

No matter how formidable or efficient a fighting ship may be it must have fuel in abundance for the best results, and if a certain and ample supply is always sure, its possible radius of action is unlimited. Without fuel, defense is not only weakened, but attack is impossible. Stationary coaling stations do not insure a constant and unlimited supply of fuel, nor do ordinary colliers in time of war. The ordinary collier may form an important unit of the movable base for the supply of such ships as may visit it, and may well be employed in coaling ships which are in the floating dock or are receiving the attention of the repair ship, but considered as sub-bases they fail in efficiency. As a sub-base the collier should have speed equal to the fleet, that it may not retard the same, may quickly join it, or may evade pursuit and capture, and its fuel carrying capacity should be very great. Having these qualities it is still essential that the collier should be able to transfer fuel in any condition of sea or weather, to become in any manner an ideal adjunct to a fleet.

The transference of coal at sea is as yet an imperfectly solved problem. Sufficient experiments have been made to demonstrate that coal can be transferred from a collier to a war ship at sea when the latter is towing the collier, and a trolley system has been rigged between the masts of the two vessels. The transference, however, becomes more slow and difficult as conditions of sea and weather become worse, and as considerable speed of towing is necessary and much sea room required, conditions will be reached when more coal is burned in the operation than will be transferred, or a ship will be obliged to abandon an important strategic position which may never be regained. A collier of the capacity desirable for extensive and distant operations could not well be towed by a moderate sized war ship, nor a collier without masts be used with this method, so that its usefulness and possibilities are limited.

It is desirable that coal should be transferred at sea at any time and in any condition of sea or weather as rapidly as possible.

It has recently been proposed to transfer coal at sea with the war ship and collier alongside of each other and prevented from colliding by forcing strong jets of water towards each other from

different points below the water line. The proposal is attractive, and, if its expectations are realized, much more than the transference of coal at sea will be solved. Fitted with such an appliance the repair ship would be enabled to operate alongside other ships under conditions otherwise impossible, as would also the other units of the movable base, if so fitted, to many or most of which the present trolley system of transference would be of little or no use under any conditions.

MAGAZINE AND EQUIPMENT SHIPS.

No modern naval war has witnessed the contingency of a vessel or fleet with exhausted ammunition and no supply at hand. It has seen operations against shore batteries and forts curtailed lest such a condition exist, and it has seen steel projectiles used against fortifications when cast iron would have been more economical and suitable. Although exhausted ammunition has not yet been recorded, it is still a highly possible contingency in a modern naval war. Rapid successive engagements may not be possible of avoidance when on the purely defensive, and successive victories may end in defeat and destruction when ammunition fails. Years of peace are apt to cloud our sight to this contingency. Ordinarily the deterioration of ammunition from age is our greatest concern, and target practice gives no idea of the exhaustive hail of small calibre shot that may be required to meet a well-directed and determined attack of torpedo craft. The question of coal supply we can never avoid, but the question of exhausted ammunition when far from a base, we have yet to face. We may hope to secure coal by some means when far from a base, but available ammunition will never be captured, confiscated or bought, under like conditions.

This possible condition of depleted or exhausted ammunition of any or all calibres suggests a magazine ship as an important unit of a movable base, and as a still more important naval adjunct, if of sufficient speed and capacity to become a flying sub-base. As the ammunition should be stowed below the water line, this vessel may at the same time become an equipment ship carrying such equipment stores above the water line as are most essential and most likely to need renewal.

RECRUITING AND HOSPITAL SHIPS.

As a badly disabled man is of no value as a working unit on a fighting ship, it is highly important, both for his own comfort and

the good of the ship, that he be removed as soon as possible and his place supplied with an able bodied man.

As men ready and fit for service go to the fleet and the ill and disabled come from it, recruiting and hospital service can be combined to advantage on the same ship. Not all humanitarians will agree to this proposition, as it will deprive the ship of the immunity enjoyed by a purely red-cross institution, but if the ship be given great speed it may readily avoid capture and will the sooner bring the ill and disabled to greater comfort and the sooner supply their vacancies in the fleet.

In emergency and particularly in the early stages of defensive operations, the recruiting and hospital ship may become of the greatest value for use as a transport. The prompt landing of a few hundred men before strong opposition from sea or land can be offered, may secure the rapid and safe establishment of a movable base, or the successful holding of other important positions, which many times the same number of men could not effect after a slight delay.

The maintenance of hospital ships or of transports, alone, does not appeal to us in time of peace, therefore this class of sub-bases may ordinarily be usefully and constantly employed as training ships for landsmen, which will insure the readiness for use of these ships.

THE COMPLETE BASE.

The complete movable base consists, then, of floating dry docks, repair ships, colliers, magazine and equipment ships, and recruiting and hospital ships, to which may be added provision and refrigerating ships, and most of which may become transports to a greater or less extent in time of necessity.

With the exception of the floating dock all of these units should be given great speed and equipped with transferring devices so that they may become of the greatest possible efficiency as flying sub-bases. As there is a natural disinclination to put great value into a vessel for naval purposes which cannot fight, the sub-bases may be lightly armed with three and four inch calibres and smaller rapid fire and automatic guns, thus protecting them to some extent, and rendering them most formidable commerce destroyers.

There is also farther reason for lightly arming these vessels. The movable base will be established as near the scene of opera-

tions as possible, perhaps in a hostile country itself. It is desirable to employ as few vessels of the fleet as possible in the protection of the base, and to this end more or less of the guns from the sub-bases may be landed and emplaced in shore batteries for protection both from land and seaward. One of our latest lessons in naval warfare is that land batteries are hard to silence and still harder to destroy, and that in closely engaging them a ship takes undue risk. With concrete and deflecting armor and the unlimited space afforded on shore, it seems a safe assertion to say that in a few days a battery could be constructed that the heaviest guns afloat could not destroy. Deflecting armor and cement for concrete may readily be carried in abundance on the floating dock, as might also land and floating pile drivers for farther aid in fortification work. If desired, a few larger calibre guns could be carried in storage on the dock for rendering shore batteries still more formidable. With the assistance of torpedoes, sub-marines, and monitors, in conjunction with the shore batteries, the defense of the movable base could be made very formidable, and the cruising fleet would be left largely free for independent operations.

In the defense of the movable base it is important to note that its most essential unit, the floating dock, can be rendered nearly invulnerable by almost complete submergence. No more than a couple of feet of the side walls need be left above the water line, and should these be pierced, the dock can be readily and quickly raised a little higher and the shot holes stopped with plank and oakum. The accidental sinking of a floating dock may be prevented by placing a watertight deck in the side walls at a suitable height; in a military dock such a deck is advisable for the farther reason that docking operations may be hastened by eliminating the necessity of skillful management when reaching deep submergence.

Having the floating dry-dock as the essential unit, it is not absolutely necessary that the others should be the high speed, lightly armed vessels that are herein advocated, in order to constitute a very efficient movable base for operations in one place without extended scope. Merchant vessels can be taken in emergency and converted to as great advantage as possible, and convoyed to the site of the base while the dock is being towed. The floating dock cannot, however, be left to be secured when the emergency occurs. Ordinarily it can be built in two years; under stress the

usual types can be built in a year, and the sectional type can be built in six months by constructing the sections at different ship yards.

AVAILABLE FLOATING DOCKS IN THE WORLD.

The United States has a modern military floating dock at New Orleans of fifteen thousand tons capacity, but not equal to the heaviest ships it is building. It has a ten thousand ton dock at Pensacola purchased from Spain, and of doubtful value for a movable base. In two years it will have in the Philippines the most complete military dock of modern times, of sixteen thousand tons capacity and equal to the heaviest ships it is building.

Great Britain has recently installed at Bermuda a floating dock of the same type as that at New Orleans, of nearly sixteen thousand tons capacity.

Austria is building a floating dock of fifteen thousand tons capacity for the naval station at Pola.

Spain has a new floating dock in the Mediterranean of twelve thousand tons capacity.

In Germany there are commercial floating docks that are available for military operations. Four at Hamburg, of which one has a capacity of seventeen thousand five hundred tons, one a capacity of sixteen thousand tons, and the other two of lesser capacity. At Stettin there is a German dock of eleven thousand tons capacity.

While the docks mentioned are, mostly very able and efficient, none of them have reached the state of development desirable in the basis of a movable base.

COMPOSITION OF BASE.

A complete and efficient movable base will consist of one floating dry dock, two repair ships, four colliers, two magazine and equipment ships, and two recruiting and hospital ships; the ships to be of the high speed and lightly armed type called flying sub-bases. For greatest safety in assembling at a selected location, transference to another locality, or general dispersal in emergency, the floating dock should consist of the sectional type in four sections, any three of which should be capable of lifting the heaviest battle ship or the longest cruiser.

The location of a temporary base having been selected, each section of the dock is taken in tow by one or more of the ship

units and the base is proceeded to as expeditiously as possible. It has been demonstrated that a floating dock can be towed at an average rate of one hundred miles per day, and with the sectional type towed in sections by the powerful sub-bases, a greater speed might easily be reached. The arrival of three sections of the dock at the base is practically certain under any circumstances, especially if convoyed by war ships, and the arrival of all sections is almost sure, in which case the fourth section is available for the docking of tugs, torpedo boats, and other small craft. The movement of this base may be made as secret as possible, the various units departing from different permanent stations at various times and by various routes, or it may be made openly and advertised to the world, as circumstances may indicate.

When a movable base has been established in a hostile territory and war has fairly begun, its removal or dispersal will be more difficult of accomplishment than its assembling. The flying sub-bases may be able to care for themselves, but the slow moving dock is less fortunate. A dock may, of course, be quickly destroyed in extremity and need never be captured, but destruction is an undesirable event. Here again the sectional dock offers the greatest possibilities. It may be moved, one section at a time, in the face of possible detection and opposition, as the capture of one section may well be risked, for it means no material benefit to the captor.

CONSTANT USE.

The complete movable base will never be realized if it is to be purely a war luxury, and if reserved for that it might be of doubtful effectiveness when needed. Its units should be in constant use in order that we may be familiar with their handling and that they may be in a known state of efficiency.

There is plenty of use for all the floating dry docks we may build, and as a peace tool they have many advantages over the land dock. When a new permanent base has been selected, a floating dock can be towed there and we are at once ready for the most important operation that is performed on a repair station. By taking a repair ship with it we have at once an effective shop, if the dock is not already fitted as such.

The selection of a site for a land dock on a new station is not a matter to be quickly or lightly disposed of to the best advantage, and the floating dock gives plenty of time for due consideration

of the matter. Should the site selected for a new station prove undesirable or a more practicable one be found, there is far less to be abandoned if we have a floating dock that can be towed elsewhere.

For cleaning, painting and light repairs, the floating dock is much more desirable than the land dock as it brings the ship well above the water surface into light and air where operations can be conducted with the greatest facility and effectiveness. As a ship has been cut in two, pulled apart thirty feet and lengthened in the center on a floating dock, there remains no doubt about what can be done on them in the way of heavy repairs.

The docking of ships is at present confined to one small class of officers, but if floating docks are to be of any importance in future naval strategy, their use and operation should be familiar to every line officer, and is next in importance to a knowledge of steam engineering.

The use and operation of a floating dry dock is not complicated. When placed in the axis of a current the entering of a ship is greatly facilitated, its centering is an easy matter, and with our system of docking keels giving three lines of support on the bottom, its proper landing is very simple. Without other knowledge of the dock, if pumping is begun at the center compartments and continued towards the ends until the ship is out of water, no injurious strains will be caused whose development would not be perfectly apparent to the eye in time to stop. There is less chance of injury in this class of docking, as two elastic and floating structures are coming in contact instead of an elastic and a fixed and rigid one.

From a strategic point it is important that a standard type of dock be selected as soon as one can be determined on, so that when the officer has become familiar with one he will understand all.

The constant use of floating dry docks can be assured, and the next consideration is the repair ship. It has been mentioned how these ships can be of value in founding a new station, and they would be of farther value as a constant adjunct to a squadron in foreign waters or during manœuvres. When a ship is injured at a distance from a repair station prompt aid may mean its salvation.

Not the least valuable use of the repair ship in time of peace

would be as a training ship for naval artisans. The training of a landsman to a seafaring man of ability, whether he be gun pointer, machinist, electrician, or quartermaster, is a matter requiring care and consideration, and we have demonstrated that it can best be commenced on training ships.

The constant use of colliers in time of peace needs little discussion. At present we must, perforce, supply our fixed coaling stations from mercantile colliers on account of lack of naval colliers. Coaling at sea we only attempt as a manœuvre on account of its present difficulties, and at times in foreign countries we may pay large prices for inferior fuel. Much of this could be remedied with a few suitable and well equipped colliers of large capacity, and the service should not rest until some quick and certain method has been found for coaling ships at sea.

It has already been mentioned how the recruiting and hospital ship may ordinarily be used as a training ship, and the same may be said for the use of the magazine and equipment ship. We are just emerging from the period when we had added fighting ships to our navy until we had not only more than we could competently dock, but had many that we could not dock at all without civil aid, and at one time without foreign aid.

We are now entering, if we are not already in, the period when we will not have enough training ships to supply our squadrons with suitably broken in landsmen who have had a chance to acquire a taste for the sea in some comfort and under conditions that would make them of the most value.

Aside from its value as a training ship, the presence of a magazine and equipment ship with a squadron, whose supply of ammunition would thus be greatly increased, would greatly augment its military value.

As training ships, alone, there seems to be sufficient reason for the existence of the flying sub-bases.

STRATEGIC VALUE.

The movable base suggests, first and last, distant or foreign operations, but considered from a purely defensive standpoint, it has a much more important value to the navy.

Our naval bases on the continent were established many years ago in the time of wooden sailing ships and short range cast iron guns. When established they were geographically unassailable,

and strategically, fairly so for the times and circumstances. With few exceptions, they are no longer unassailable. Were they all impregnable, they are too few and too poorly located for a satisfactory naval defense of our extensive coasts.

When our land dry docks, under construction and projected, are all finished our docking facilities, considered from a defensive war basis, will still be greatly inadequate to our needs.

By placing a thoroughly developed military floating dock at each of our naval bases, we may in time of threatened danger double our available bases on the coast by towing the docks to various points of vantage, or in the last extremity, if forced to retreat up our rivers and bays, we may take our floating docks with us and establish movable bases that will the sooner enable us to again reach our coasts.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE LIFTING NET FOR CATCHING FISH IN TROPICAL WATERS FOR FOOD FOR VESSELS OF THE UNITED STATES NAVY.

By LIEUT.-COMMANDER M. L. WOOD, U. S. Navy.

As the result of some experience in tropical waters, the following is submitted to the members of the INSTITUTE as a means for giving healthy occupation to the men on board naval vessels stationed in the Caribbean and other tropical waters with incidentally the result of supplying, under favorable conditions, fish for the entire crew. If tried on a large scale, with equipments fitted for the purpose, it could be made of some commercial importance in some harbors.

A plan has been devised and has worked so successfully on board the Eagle that I think it worth while to publish it for the benefit of members of the institution who may have occasion to be irritated by the sight of quantities of fish in tropical waters, which will not take a bait and which are much needed for use of the crew. To such I recommend the following plan of utilizing articles found in the regular equipment of naval vessels having electric lighting plants.

When alongside a wharf, or at other convenient times, take the ship's seine and fold it in three, so the center of the purse comes in the center of the rectangle thus formed. Marl the edges together with spun yarn, stopping all holes noticed when net is stretched, by a few turns of rope yarn. Pass a head rope and a foot rope, 2-inch hemp, across the rectangle thus formed, securing head and foot ropes of seine to take strain, and bind over and stop the ends of the rectangle when the seine is folded. Lash weights on bottom of seine to overcome buoyancy of corks and sink corners.

When at anchor in tropical waters, test for fish by hanging gangway cargo light, or small arc lamps fitted with conical tin screen. If quantities of minnows come around, followed in two or three hours by large fish, hang the seine horizontally between the port lower boom and a strong back rigged as a boom well forward on the port bow, by whips through blocks at end and heel of each boom. Rig out a small spar and hang cargo light over center of net, by a whip, so that it can be raised or lowered as desired. When all fitted, lower net down near the bottom, keeping it clear of anchor and rocks. It must be well down, the further the better.

In two or three hours' time, if any large fish are seen near the surface, haul up by running outhauls and inhauls together, timing last haul so as to enclose fish at surface, until edges of net are out of water all around. Any fish can now be taken out by a scoop-net worked from the punt, or hauled on deck, or taken into a punt by casting off lashings and making a hole in net.

The net is now lowered and another haul made when sufficient fish show themselves. The anchor watch and a few idlers can lift the net above water without disturbing any one. If a big haul comes, a fishing detail will be required to get the fish on deck, clean fish and stow in cold storage room.

On board the Eagle, in a favorable locality, by making one haul at 8.30 p. m., and another just before dawn, we have caught so many fish that we have supplied every body on board and a fishing village besides. The varieties caught are cavallo, moon fish and herring, all excellent food.

The quantities of fish vary greatly at the same anchorage for different stages of tide, amount of moonlight and state of sea. Very few fish will be seen under the following conditions:

Bright moonlight first part of night; very rough weather or when water is muddy; anchorages in shoaler water, also at other times when schools of fish will leave suddenly, from no apparent reason, and remain away, possibly on account of sharks or other enemies below the surface.

By testing with the gangway light near the water every night, a good idea can be obtained of when it is worth while using net.

For this purpose a rectangular net, thirty by one hundred (30 x 100) feet, made for the purpose, would be more convenient, as the weights and floats of a regular seine make it heavy to handle

out of water. As it probably will be some time before regular nets are furnished, the seines on board will have to be used. They can be stopped in shape and stowed by merely taking off the extra weights. In case the service of the seine is required full length, it can be opened out in a few minutes.

It will be seen that the only thing original is the combination of the bright light at the surface of the water, to draw the little fish for bait to attract the bigger ones, and a lifting net to get them out of water, all improvised from the regular equipment of a United States naval vessel. Though simple, I have found it so effective that the men have had more fish than they cared to eat for two weeks at a time, and have given away every day twice as many as are used.

By cleaning fresh fish with a regular detail, and putting the fish within half an hour in cold storage, a very agreeable addition of fresh fish is furnished the men's bill of fare in places where such additions are doubly valuable owing to the absence of markets.

It will be noticed that use is made only of articles in the regular equipment of United States naval vessels fitted with electric lights, also that the fishing is done from anchorages for naval vessels and from the ship itself.

That the work required is small.

That it can be carried on without interfering with the regular routine, as it is done by night, and also that it can be carried on in a flagship without interfering with the appearance of the vessel, as the net can be rigged and unrigged in a few minutes and only kept out after sunset.

There is another point which may be of interest. A great difference has been found in the quantities of fish at anchorages a hundred yards apart. As a rule, I have found the greatest quantity of free swimming fish in the channels just inside the entrance to harbors where the water is the deepest. The best locality in any harbor can only be learned by experience.

I would be pleased to have the results of this plan of fishing communicated to me, with data as to the influence of the light of the moon, by any member of the INSTITUTE availing himself of the opportunity for a trial in tropical waters.

In conclusion, I will state that on the morning of the 26th of November, a few days ago, from one lift of the net, at 5.00 a. m.,

so many fish were caught that it was unsafe to lift the fish on deck, and they were taken out through a hole made in the bottom of the net by casting off the stops securing the folds of the net. Besides what were used on board, over eight hundred (800) were given away to natives on shore, enough to give a mess of fish to the crew of any second-rate vessel.

Should a single mess of fish be furnished a vessel stationed in the Caribbean waters, through the details given in this paper, its object will have been attained.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

A PROPOSED SYSTEM OF PUNISHMENT FOR CERTAIN OFFENCES AGAINST NAVY REGULATIONS.

By Lieutenant B. B. Bierer, U. S. Navy.

The following table of offences and punishments is submitted for consideration and comment; believing that if the same could be carried into effect, it would materially increase the discipline of our naval service:

Offences.	Punishments.	Guilt determined and punishment awarded by
Overtime from liberty, 2 hours or under.	Lose 1 day's pay.	The commanding officer.
Over 2 hrs. to 4 hrs.	" 2 " "	" " "
" 4 " " 6 "	" 3 " "	" " "
" 6 " " 8 "	" 4 " "	" " "
" 8 " " 10 "	" 5 " "	" " "
" 10 " " 12 "	" 6 " "	" " "
" 12 " " 14 "	" 7 " "	" " "
" 14 " " 16 "	" 8 " "	" " "
" 16 " " 18 "	" 9 " "	" " "
" 18 " " 20 "	" 10 " "	" " "
" 20 " " 22 "	" 11 " "	" " "
" 22 " " 24 "	" 12 " "	" " "
" 24 " " 36 "	" 16 " "	" " "
" 36 " " 48 "	" 20 " "	" " "
(a) Overtime from liberty, over 48 hrs. and under ten days. (b) Leaving ship, Navy Yard, or Naval Station, without proper authority. (c) Under the influence of liquor. (d) Alcoholic liquor in possession. (e) Smuggling, or attempting to smuggle, alcoholic liquor, on board ship, or in Navy Yard, or Naval Station.	1st offence: Lose 1 month's pay. 2nd offence: Lose 2 months' pay. 3rd offence or additional offences: Lose 3 months' pay; or discharge from the service with bad conduct discharge, at discretion of the Commanding Officer and with the approval of the Bureau of Navigation.	A court of three officers, the majority deciding, but with no more paper work than that required for a punishment awarded by the Commanding Officer.

Tight from liberty—not in itself an offense.

When men are deprived of liberty for any length of time at a place where their shipmates are enjoying this privilege, it makes those deprived of this liberty, restless and dissatisfied. It

leads to misconduct—serious sometimes—and, in many cases, to desertion.

For the offences of overtime from liberty over 48 hours and under ten days; leaving ship, navy yard, or naval station without proper authority; under the influence of liquor; alcoholic liquor in possession; and smuggling, or attempting to smuggle, liquor; three courts martial, or less, with increased loss of pay for each additional offence, stops, as a rule, these offences by the person concerned; and I feel that the punishment for these offences should be the same on board all vessels and at all naval stations.

I think all, or nearly all, who have a thorough knowledge of the subject, will agree that a system with loss of pay as the punishment for the offences above tabulated is far superior to any other; just as a fine is considered the adequate punishment for a violation of city ordinances of a similar nature.

The loss of pay for an offence is a question that requires careful consideration, for there are two objects to be attained, viz.: the adequate enlistment of desirable men and their retention in the service until retired, and the maintenance of discipline. All other objects are comprised in these two.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NAVIGATOR'S PROTRACTOR.

For Plotting a Ship's Position by the Three-Point Problem.

By LIEUTENANT ARMISTEAD RUST, U. S. Navy.

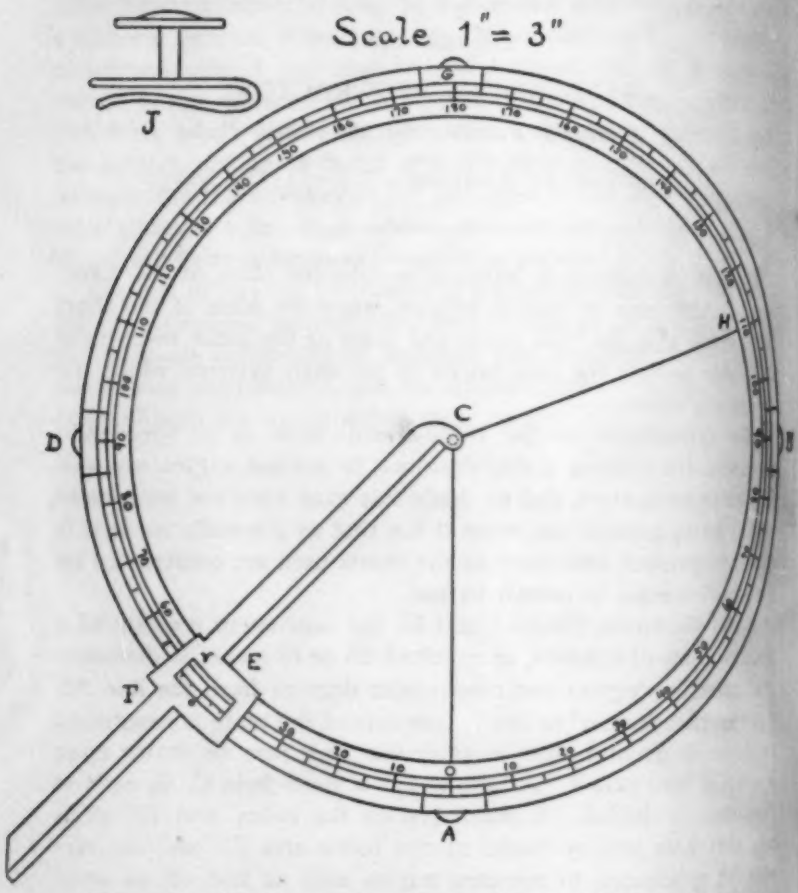
1. This instrument is intended to take the place of the three-armed protractor or station pointer, when the scale of the chart is so small that the hub, circle and arms of the latter instrument are liable to hide the land marks on the chart between which the angles are taken.

The advantages of the three-armed, both as to speed and accuracy, for plotting a ship's position by sextant angles, are well known to navigators, and no doubt this most excellent instrument would be in general use, were it not that as generally made it is rather expensive, and many of the charts used are constructed on too small a scale to permit its use.

2. As shown on Sheets I and II, the instrument consists of a circular plate of xylonite, or celluloid, 16 or 18 inches in diameter, graduated in degrees and one-quarter degrees from the line AC right and left from 0° to 180.° One side of the plate is roughened to resemble ground glass in order that lines may be drawn upon it with a lead pencil. At the center a small hole C, ⅛ inch in diameter, is drilled. A small pin on the index arm EC ships into this hole and by means of this index arm EC and the vernier V, graduated to minutes, angles may be laid off as accurately as with an ordinary station pointer. The index arm has a beveled edge and may be extended beyond the edge of the protractor as far as convenient or be fitted with an extension piece. A, B, C, and D are small brass clips with buttons, shown full size at J. These clips are slipped over the edge of the protractor for convenience in handling.

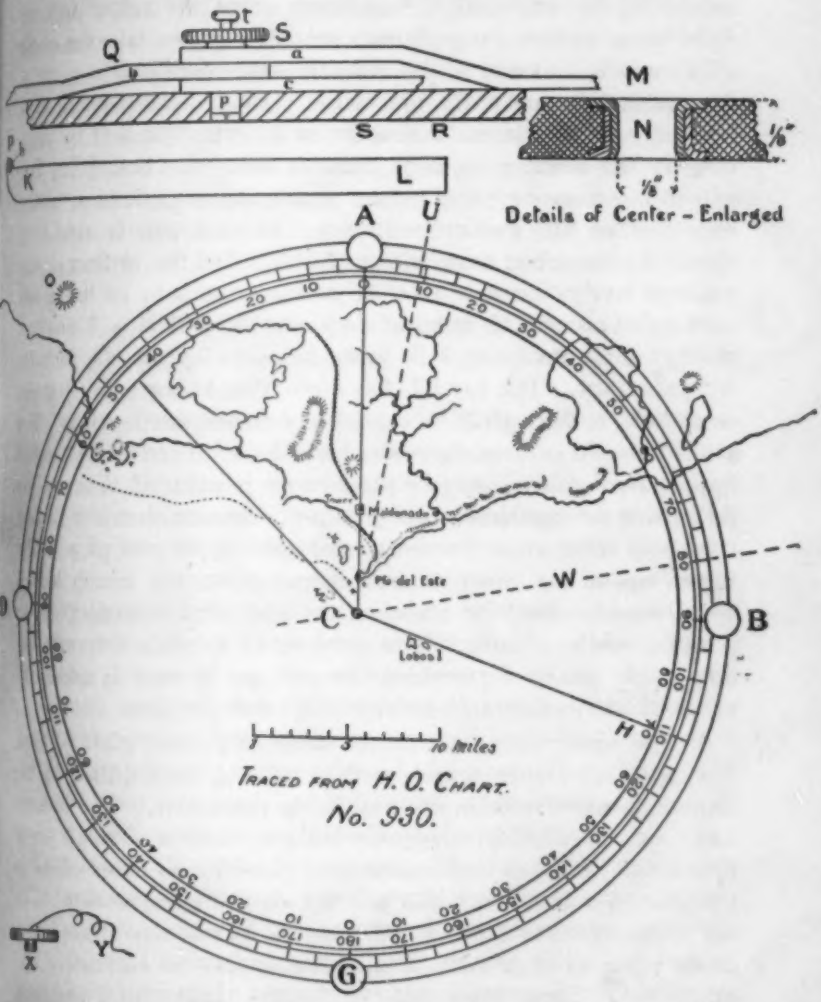
3. *To Use the Protractor.*—Though this protractor is used just as the ordinary station pointer or a transparent protractor made on tracing cloth or paper, there are several practical points deserving attention.

4. Referring to Sheet I, the case here shown is taken from actual practice.



Example.—While passing betwen Pta. del Este and Lobos Island, these angles were taken: right angle, right tangent Lobos Island to Pta. del Este Light House, and Maldonado Cathedral in range 110°; left angle, same range to peak marked 0.45.° Plot position. Turn the protractor as shown on Sheet I, rough side up, and zero of the scale towards you. Ship the

index arm EF, lay off the angle ACH = 110°, draw the line CH; lay off ACE = 45°, draw CE. The line AC should be permanently drawn on the plate. Unship the radial arm CF, and hold-



ing the protractor by the clips B and D, revolve it about the diameter BD so that the zero will be away from you, bringing the roughened side next to the chart. By doing this the parallax due to the thickness of the plate, is eliminated, and the rough surface in no way interferes with the transparency of the plate.

If a sheet of ground glass 1/8 inch thick be laid on a chart with the rough side up, the lines on the chart will be indistinct, but if the rough side be placed next to the chart, they may be clearly seen. As the angle ACH was taken when the tower and the light house were in range, it was not necessary to take the angle ACE, which is plotted to illustrate the case when one or more of the points fall outside the protractor. To plot the position with the angle ACO, use the index bar as an extension arm by shipping it and making its edge coincide with the line CE. The pencil lines may be easily erased with a damp cloth or a rubber eraser, when they become too thick. As each pair is used they should be scratched over with a pencil. For the ordinary purposes of navigation it will not be necessary to have an index bar with a vernier. The straight edge shown at KL will answer, the 1/4° divisions being sufficiently large to lay off 7½ minutes with accuracy. The bar KL has a pin P to fit the hole C, and a small hole, h, through P for a pricker, to mark the position. The pin, P, should project above the bar KL in order that two other light extension arms may be placed over it when all three points lie outside the protractor; see QR- p-pin secured to arm c; a and b ends of other arms, curved to ship over upper end of p. The upper end of the pin p is also threaded for the thumb nut S which may be used for clamping the arms and holding them in position while plotting. The pricker, t, extends through the hole in the pin, p, for making the position when it is necessary to use the extension arms, which will rarely happen.

6. The writer uses a protractor made of ground glass 1/8 inch thick, and 16 inches square, with a hole 1/8 inch drilled in the center, no more suitable material being obtainable. The corners were cut off making a regular octagon, and a circular paper protractor 16 inches in diameter was glued by its outer edges to the ground side of the glass and the central part cut out. The arc is graduated to degrees and quarters, 15 minutes of arc being about equal to 1/32 inch, so that angles may be accurately laid off to 1/8°. Three brass clips or handles similar to J are used for lifting, and except for the inconvenience in handling, which necessarily requires great care, this has proved a very efficient instrument, with which positions may be plotted with far greater ease and accuracy than by compass bearings. The pencil marks may be readily erased with a damp cloth.

7. There are other uses to which this instrument may be put which will suggest themselves to the navigator. For instance it may be used with advantage instead of parallel rules to lay off courses. Thus referring to Sheet I, place the center of the protractor over the position of the ship at C; bring the zero line ACG parallel to a meridian marked on the chart. This is readily done as the chords joining the extremities of equal arcs laid off from ACG are all parallel to ACG. CU is the meridian through C. Revolve the protector through an angle equal to the compass error, to the right if easterly, to the left, if westerly, and the compass course corresponding to the direction CW is read from the protractor, N. 80° E., the assumed error in this case being 9° west.

To aid in laying off courses when the distances are great, a cord Y, attached to a metal button, X, with a small stud, to fit in the hole C, may be used.

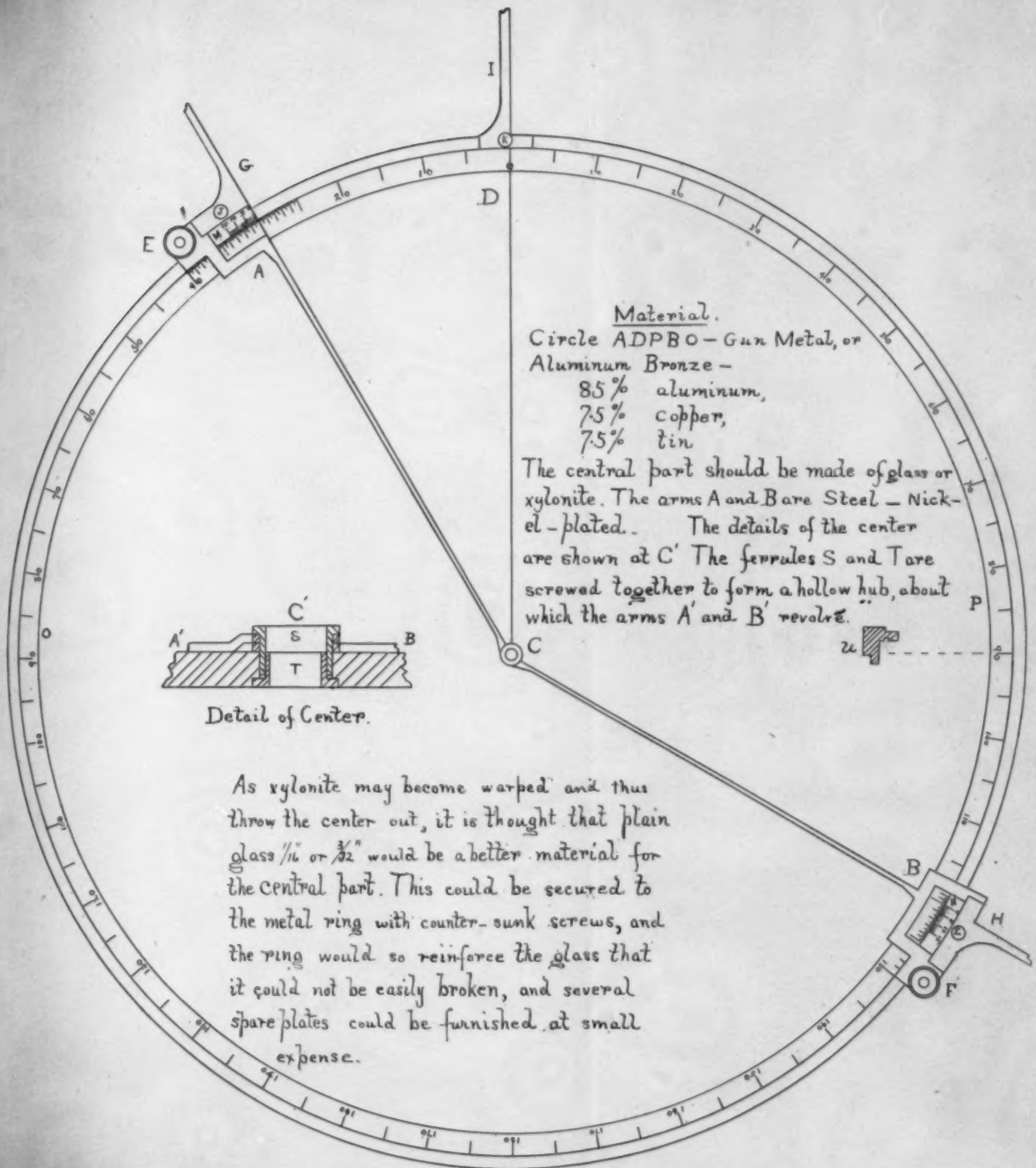
8. A more convenient and accurate instrument is shown on Sheet III. This consists of a circular plate of xylonite or other transparent substance, about 1/16" or ⅛" thick, smooth on both sides, and secured to a metal ring, which may be graduated, or the ring may be plain and the graduations made on the transparent plate. The arms A and B rotate about the hollow center C, through which the point of a pencil is inserted to mark the position of the ship. These arms are fitted with verniers, M and N, clamp screws, E and F, and extension pieces, G, H, as long as desired, held in place by the screws J and L. The verniers read to minutes, and the divisions are sufficiently large to permit the verniers being set without the aid of a magnifying glass. The xylonite plate is smooth on both sides, as the arms, A and B, make it unnecessary to mark the lines on the plate.

Two forms of vernier are shown. The one fitted to the arm A is so arranged that when both arms are fitted with this pattern, the index edges of the arms may be made to coincide on the line CD. CD is marked permanently on the plate, and has an extension piece held in place by the thumb screw K. The vernier shown at A permits very small right and left angles being used, but that shown at B is stronger.

The details of the vernier, clamps, &c., may be similar to those used on the ordinary three armed protractor or sextant, but it is thought that tangent screws are unnecessary, on account of the size of the divisions of the arc and vernier.

A section of the ring is shown at U. If made of aluminum bronze, the ring may be made wider and thicker without increase of weight, and the arms A and B may be made to stand edge-wise to the plate, which would be an advantage, serving to correct the parallax in plotting due the thickness of the plate and at the same time, appearing only as lines when viewed from above, they will not obscure objects on the chart.

If, however, the instrument is intended to be used in surveying, the arms and their extension pieces should be made heavier, so as not to be sprung when very long extension pieces are used, which is often necessary when working on a large scale chart. Each extension piece should be made in two parts.


I
G
D
E
A
Material.
Circle ADPBO – Gun Metal, or
Aluminum Bronze –
85% aluminum,
7.5% copper,
7.5% tin
The central part should be made of glass or xylonite. The arms A and B are Steel – Nickel-plated. The details of the center are shown at C' The ferrules S and T are screwed together to form a hollow hub, about which the arms A' and B' revolve.
P
O
C
C'
A'
S
T
B
Detail of Center.
As xylonite may become warped and thus throw the center out, it is thought that plain glass 1/16" or 1/32" would be a better material for the central part. This could be secured to the metal ring with counter-sunk screws, and the ring would so reinforce the glass that it could not be easily broken, and several spare plates could be furnished at small expense.
B
H
F

NAVIGATOR'S PROTRACTOR FOR PLOTTING A SHIP'S POSITION BY THE THREE POINT PROBLEM
(Full Size).

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NOTE ON BALLISTIC TABLES.

By Professor Philip R. Alger, U. S. Navy.

In Ingersoll's Exterior Ballistics it is stated that the values in his Ballistic Tables, which are based on Mayevski's deductions from Krupp experiments, have been reduced to a standard atmospheric condition of thermometer 62° F., barometer 30 inches.

In Ingalls' Hand-book of Problems in Exterior Ballistics, he assumes that his Ballistic Tables (Artillery Circular M, Series of 1893), which are also based on Mayevski's deductions from Krupp experiments, have been reduced to a standard atmospheric condition of thermometer 60° F., barometer 30 inches. Ingalls also, in his Table VI, gives the ratio of the density of air at 60° F., barometric height 30 inches, and two-thirds saturated with moisture, to the density of standard air the value unity, thus showing that he regards a standard atmosphere as being 60° F., 30 inches barometer, and two-thirds saturation.

Both Ingersoll's and Ingalls' Ballistic Tables have thus far been used, as illustrated by their authors, on the above assumptions.

Actually, Krupp's results, as used by Mayevski in deducing his formulæ for air resistance, and also as used by Zaboudski in his extension and modification of Mayevski's formulæ, were reduced to a standard atmospheric condition of 15° C. (59° F.), barometer 750 mm. (29.5275 inches), and one-half saturation, and both Ingersoll and Ingalls used these formulæ without other change than converting French to English units.

Consequently an erroneous assumption has heretofore been made in the use of both Ingersoll's and Ingalls' Ballistic Tables, giving in the former case an error of 1 per cent, and in the latter

case an error of 1.4 per cent in the value of the ballistic coefficient. The assumed standard air being denser than the true standard air of the Ballistic Tables, this error should cause the value of the coefficient of form (c) of standard projectiles to appear to be less than unity instead of unity as it should be.

The following table, if substituted for Table VI in Ingalls' Ballistic Tables (Artillery Circular M, Series of 1893), will furnish the true correction for differences of temperature and pressure from the assumed standards, the ballistic coefficient being divided by $\delta\left(C' = \frac{w}{\delta c d^2}\right)$ to make the correction.

TABLE I.

Values of δ, the ratio of the density of half saturated air for a given temperature and barometric height to the density of half-saturated air for 15° C. (59° F.), and 750 mm. (29.5275 inches) barometric height. Computed by the formula $\delta = \frac{1.05498}{29.4338} \cdot \frac{H - \frac{4}{10} F_t}{.92485 + .002036\ t}$, in which H is barometric height in inches, t is temperature Fahrenheit, and F_t is the vapor pressure in saturated air at t°.

t_f	28 in.	29 in.	30 in.	31 in.	t_f	28 in.	29 in.	30 in.	31 in.
0	1.073	1.112	1.150	1.188	50	.966	1.000	1.035	1.069
1	1.071	1.110	1.148	1.186	51	.964	.998	1.033	1.067
2	1.069	1.108	1.146	1.184	52	.962	.996	1.031	1.065
3	1.066	1.105	1.143	1.181	53	.960	.994	1.029	1.063
4	1.064	1.103	1.140	1.178	54	.958	.992	1.027	1.061
5	1.062	1.100	1.137	1.175	55	.956	.990	1.024	1.058
6	1.060	1.098	1.135	1.173	56	.954	.988	1.022	1.056
7	1.057	1.095	1.132	1.170	57	.952	.986	1.020	1.054
8	1.055	1.093	1.130	1.168	58	.950	.984	1.018	1.052
9	1.052	1.090	1.127	1.165	59	.948	.982	1.016	1.050
10	1.050	1.088	1.125	1.163	60	.946	.980	1.014	1.048
11	1.048	1.086	1.123	1.161	61	.944	.978	1.012	1.046
12	1.046	1.084	1.121	1.159	62	.942	.976	1.010	1.044
13	1.043	1.081	1.118	1.156	63	.941	.974	1.008	1.042
14	1.041	1.079	1.116	1.153	64	.939	.972	1.006	1.040
15	1.039	1.077	1.113	1.150	65	.937	.970	1.003	1.037
16	1.037	1.074	1.110	1.147	66	.935	.968	1.001	1.035
17	1.035	1.072	1.108	1.145	67	.933	.966	.999	1.033
18	1.032	1.069	1.105	1.142	68	.931	.964	.997	1.031
19	1.030	1.067	1.103	1.140	69	.929	.962	.995	1.029
20	1.028	1.065	1.101	1.138	70	.927	.960	.993	1.027
21	1.026	1.063	1.099	1.136	71	.925	.958	.991	1.025
22	1.024	1.061	1.097	1.134	72	.923	.956	.989	1.023
23	1.021	1.058	1.094	1.131	73	.921	.954	.987	1.021
24	1.019	1.056	1.091	1.128	74	.919	.952	.985	1.019
25	1.017	1.053	1.088	1.125	75	.917	.950	.982	1.016
26	1.015	1.051	1.086	1.123	76	.915	.948	.980	1.014
27	1.013	1.049	1.084	1.121	77	.913	.946	.978	1.012
28	1.011	1.047	1.082	1.119	78	.912	.945	.977	1.010
29	1.009	1.045	1.080	1.117	79	.910	.943	.975	1.008
30	1.007	1.043	1.078	1.115	80	.908	.941	.973	1.006
31	1.005	1.041	1.076	1.113	81	.906	.939	.971	1.004
32	1.003	1.039	1.074	1.111	82	.904	.937	.969	1.002
33	1.000	1.036	1.071	1.108	83	.903	.935	.967	1.000
34	.998	1.034	1.069	1.105	84	.901	.933	.965	.998
35	.996	1.031	1.066	1.102	85	.899	.931	.963	.995
36	.994	1.029	1.064	1.100	86	.897	.929	.961	.993
37	.992	1.027	1.062	1.098	87	.895	.927	.959	.991
38	.990	1.025	1.060	1.096	88	.893	.925	.957	.989
39	.988	1.023	1.058	1.094	89	.891	.923	.955	.987
40	.986	1.021	1.056	1.092	90	.889	.921	.953	.985
41	.984	1.019	1.054	1.090	91	.887	.919	.951	.983
42	.982	1.017	1.052	1.088	92	.885	.917	.949	.981
43	.980	1.015	1.050	1.085	93	.884	.916	.947	.979
44	.978	1.013	1.048	1.083	94	.882	.914	.945	.977
45	.976	1.011	1.046	1.081	95	.880	.912	.943	.975
46	.974	1.008	1.043	1.078	96	.878	.910	.941	.973
47	.972	1.006	1.041	1.076	97	.876	.908	.939	.971
48	.970	1.004	1.039	1.073	98	.874	.906	.937	.969
49	.968	1.002	1.037	1.071	99	.872	.904	.935	.967
50	.966	1.000	1.035	1.069	100	.870	.902	.933	.965

In Ingalls' Exterior Ballistics a table is given from which to take the *altitude factor,* or ratio of the density of the air at the level of the gun to its density at the mean height of the trajectory. This table was calculated, as described on page (V) of the Ballistic Tables (Artillery Circular M, Series of 1893), by the formula $f = \varepsilon^{\frac{h}{\lambda}}$, in which ε is the Naperian base, λ is the height of the homogeneous atmosphere (taken as 27,800 feet), and h is the mean height of the trajectory (taken as two-thirds the height of vertex).

This formula assumes a uniform temperature of the air at all heights, whereas we know that the temperature falls as one ascends. Consequently the values of f which have thus far been used with the Ballistic Tables have probably been too great.

The following table, which assumes a fall of temperature with increase of height according to the law of convective equilibrium, as proposed by Sir W. Thompson (now Lord Kelvin), should give results nearer the truth than those obtained on Ingalls' assumption of the isothermal equilibrium of the atmosphere.

TABLE II.

Values of the *altitude factor* f, the ratio of the density of the air at the level of the gun to its density at the height h above the gun. Computed by the formula $f = \left(1 - .29\,\frac{h}{H}\right)^{-2.451}$, in which h is the height in feet and H = 27,700 is the height of a homogeneous atmosphere of the density of the air at the gun's level.

h	0	100	200	300	400	500	600	700	800	900
0	1.000	1.003	1.005	1.008	1.010	1.013	1.016	1.018	1.021	1.023
1000	1.026	1.029	1.031	1.034	1.037	1.039	1.042	1.045	1.048	1.050
2000	1.053	1.056	1.059	1.061	1.064	1.067	1.070	1.073	1.075	1.078
3000	1.081	1.084	1.087	1.090	1.093	1.096	1.099	1.102	1.105	1.108
4000	1.111	1.114	1.117	1.120	1.123	1.126	1.129	1.132	1.135	1.138
5000	1.141	1.144	1.147	1.150	1.153	1.156	1.160	1.163	1.166	1.169
6000	1.172	1.175	1.179	1.182	1.185	1.188	1.192	1.195	1.198	1.202
7000	1.205	1.208	1.212	1.216	1.219	1.222	1.225	1.229	1.232	1.236
8000	1.239	1.243	1.246	1.250	1.253	1.257	1.261	1.264	1.268	1.271
9000	1.275	1.279	1.282	1.286	1.290	1.293	1.297	1.301	1.305	1.308
10000	1.312	1.316	1.320	1.323	1.327	1.331	1.335	1.339	1.342	1.346
11000	1.350	1.354	1.358	1.362	1.366	1.370	1.374	1.378	1.382	1.386
12000	1.390	1.394	1.398	1.402	1.406	1.410	1.415	1.419	1.423	1.427

PROFESSIONAL NOTES.

Prepared by Professor PHILIP R. ALGER, U. S. Navy.

SHIPS OF WAR, BUDGETS, AND PERSONNEL.

AUSTRIA.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Erzherzog Karl	10,600	Trieste.	Launched Oct. 4, 1903.
B (ersatz-Drache)	10,600	"	Building.
C	10,600	"	Projected.
Babenburg	8,340	Pola.	Under trial.
Armored Cruiser.			
Saint Georg	7,400	Pola.	Launched Dec. 8, 1903.
River Monitors.			
Save	450	Neupesth.	Nearly ready to be launched.
Theiss	450	"	" " " "

The dimensions of the armored cruiser St. Georg, recently launched at Pola, are as follows: Length, 383 feet 9 inches; breadth, 61 feet 7 inches; draft, 21 feet 3 inches; displacement 7300 tons; indicated horse power, 13,000; speed, 21 knots; armament, two 9½ inch guns, five 7½ inch guns, four 5⅞ inch rapid fire guns, 25 guns of smaller sizes.

The Erzherzog Karl, the first of the three new Austrian ships formerly known as A, B, and C, has at different times been compared to many larger vessels which, though some 4000 tons heavier, carry no better armament or armor, and are, if anything, inferior in speed. Such comparisons are, however, valueless. The Austrian fleet is designed for the peculiar needs of Austria, and these are so different to our own that to compare the Erzherzog Karl with any of our ships would be about as profitable as comparing chalk and cheese. Indeed, it would not be so very extreme to say that the highest virtue for an Austrian vessel is unsuitability for the British navy. Austria has no need for a large coal endurance; she has absolutely no need at all for a craft able to fight a battle in the Atlantic. The future battle-field of her fleets lies in the gentle waters of the Adriatic, and the greatest credit is due to her designers for the consistent fashion in which they have recognized this.

The Erzherzog Karl is of 10,600 tons displacement, 390½ feet long, 72 feet broad, and 24½ feet mean draught.

The armament, exceptionally powerful for a vessel of her size, consists of four 9.4-inch of 40 calibres, eight of the new 7.6-inch 45 calibre Krupps, six 5.9-inch 40 calibre, fourteen 12-pounders, twelve small quick-firing, four machine guns, and two submerged torpedo tubes—an armament that puts her in the first rank, and against which all that can be said is that it is too diverse.

The main belt is 8¼-inch thick, reinforced by a 2-inch deck and terminated by 9½-inch bulkheads. Above is a second belt, usually stated to be 8¼-inch also, but which we fancy is more probably 5-inch. The main belt is continued to the bow by 2-inch plating, and the deck at the ends is 2¾-inch.

Above the upper belt is the continuous battery, a 6-inch redoubt carrying the eight 7.6-inch guns, all of which are sponsoned; six casemates with 6-inch fronts, carrying the 6-inch guns on the upper deck.

The barbettes are 9½ inches thick, with stout supporting tubes containing the turning machinery.

The designed horse-power is 14,000, and a speed of 19 knots is expected. She is to have Yarrow large tube boilers. The exact coal supply is not yet stated, but it is known to be small from a British point of view. —*Engineer.*

FRANCE.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
République	14,865	Brest.	Launched Sept., 1902.
Démocratie	14,865	"	Building.
Patrie	14,865	La Seyne.	Launched Dec. 17, 1902.
Justice	14,865	"	Ordered.
Vérité	14,865	Bordeaux.	Building.
Liberté	14,865	St. Nazaire.	"
Armored Cruisers.			
Ernest Rénan	13,562	Brest.	Building.
Jules Michelet	13,562	Lorient.	To be begun shortly.
Jules Ferry	12,550	Cherbourg.	Launched Aug. 23, 1902.
Victor Hugo	12,550	Lorient.	Building. To be lchd. Mch. 8.
Léon Gambetta	12,550	Brest.	Under trial.
Amiral Aube	10,014	St. Nazaire.	" "
Sully	10,014	La Seyne.	" "
Condé	10,014	Lorient.	" "
Gueydan	9,516	....	" "
Dupetit Thouars	9,516	Toulon.	Launched July, 1901.
Desaix	7,700	....	Under trial.
Kléber	7,700	....	" "

The following are particulars of the building of submarine and submersible boats for the French navy under the programme of 1900, taken from the report on the estimates. Completed or in hand are twenty-eight boats of the Silure class, including also X, Y, Z, Aigrette, Cigogne, and Omega. Their value is estimated at 14,980,382 francs. The programme of 1893 contemplated the laying down of eighteen other submarines or submersibles, Q 41 to Q 58, of which eight at Cherbourg and ten at Toulon, their value being 14,006,189 francs. The provision for next year is for sixteen boats, Q 59 to Q 74, value 12,415,148 francs. The programme of 1902 provided for that year the laying down of thirteen submarines, Q 38 to Q 42 and Q 61 to Q 68, the order to begin them being dated in May, 1902; but these boats were delayed, and only Q 38 and Q 39, which received the names of Aigrette and Cigogne, are yet in hand. In addition to the eighteen boats provided for 1903 was the Omega, but this was laid down in anticipation at Toulon. At the present time only six of the eighteen have been ordered, and the work has been much retarded. The minister says the delay is solely due to the inquiries which are being made to arrive at a right model for the boats to be constructed.—*Army and Navy Gazette.*

THE LOSS OF THE VIENNE.—The search for the missing transport La Vienne, which left Rochefort for Toulon in December last, has proved unsuccessful, and the vessel is now given up as lost. Two cruisers, the Galilée and Guichen, were employed to look for her. The former searched the coasts of Spain and Morocco, and as far west as the Azores; the latter the N. W. coast of France and the south and west coasts of Ireland. It is supposed now that the Vienne foundered in the Gulf of Gascony very soon after leaving port. According to the pilot who took her out of the

Charente, the weather was very threatening at the time; so much so that he advised the captain to put back and wait till it moderated, which, however, he did not do. It is stated some ships' gratings have been found not far from the pertuis, which, though not expressly marked as having belonged to the Vienne, are nevertheless proved to be part of the upper deck equipment of some French man-of-war.

The *Temps* gives the following list of French vessels of war lost during the latter half of the 19th century, of which no traces have ever been found: The Sémillante, carrying 750 soldiers to the Crimea, lost in the Straits of Bonifacio in February, 1855; the aviso Pandour, which left Valparaiso in 1848 and was never heard of; also the gun-boat Etincelle, which disappeared in the Mozambique Channel; the aviso Monge, which left Saigon for Japan in 1868; the corvette Gorgone, which left Senegal for Brest in December, 1869; the aviso Renard, lost between Obock and Aden; supposed to have foundered in a cyclone on 3rd or 4th June, 1885; torpedo-boat 110, which left Havre for Cherbourg on 21st March, 1889, and was never seen again.—*United Service Institution.*

GERMANY.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Braunschweig.....	13,200	Kiel.	Launched; complete in 1904.
Hessa	13,200	Dantzic.	" May 26, 1903.
Preussen	13,200	Stettin.	" Oct. 31, 1903.
Hessen.....	13,200	Kiel.	Launched Sept. 18, 1903.
Lothringia.....	13,200	Dantzic.	Building.
S.....	13,200	Gaarden.	"
Armored Cruisers.			
Prinz Adalbert.....	9,050	Kiel.	Under trial.
Roon.....	9,050	Kiel.	Launched June 27, 1903.
S (ersatz-Deutschland).	9,050	Hamburg.	Building.
T.....	9,050	Kiel.	"
Protected Cruisers.			
Undine.....	2,715	Kiel.	Under trial.
Hamburg.....	3,000	Stettin.	" "
Bremen.....	3,000	Bremen.	Launched July 9, 1903.
Berlin..	3,000	"	Launched Sept. 22, 1903.
M.....	3,000	"	Building.
N (Ersatz Merkur).....	3,000	Stettin.	Building. (To have turbine machinery.)

A sixth division of torpedo-boat destroyers, Nos. 120-125, has been ordered from Schichau, at Elbing, one of them will have turbine machinery.—*The Yacht.*

Our Berlin contemporary, *Ueberall,* devotes a long article to the German navy in 1903, and remarks that the most important occurrence was the commissioning of the five ships of the Wittelsbach class. The period occupied in building these has been approximately forty months, and their maximum speed is 18 knots, as compared with 17.5 knots in the Kaiser class. At the end of the year ten battleships in all were ready, and the ships of the Siegfried class are treated nominally as battleships pending the building of new vessels. They have been lengthened, and the last of them, the Siegfried and Aegir, will be completed in the autumn, as will also the rebuilding of the four ships of the Brandenburg class. *Ueberall* considers these facts as demonstration enough of the unsatisfactory situation of Germany. Of armored cruisers, the Prinz Heinrich and Friedrich Karl are in commission, while the Prinz Adalbert, which was launched in the summer of 1901, has not yet begun her trials. Of the smaller cruisers, the Arcona

and Frauenlob are in commission, the Undine is undergoing trials, and others are coming forward. During the year the battleships Hessen, Elsass and Preussen were launched. These are of the Braunschweig class, and the last of them, M, has not yet been launched. The cruisers which took the water during the year were the armored vessel Roon and the small cruiser Hamburg, Bremen, and Berlin. The ships laid down were the battleships M and N, the armored cruiser Erstaz Deutschland, and the small cruiser Ersatz Mercur, which will be the first vessel of the German navy, with the exception of a torpedo-boat, to be provided with turbine motors. As to the arguments in the Reichstag on naval expenditure, *Ueberall* says that in the period 1901-4 a sum of 9,200,000 marks has been expended less than was intended by the naval law.—*Army and Navy Gazette.*

An interesting article appears in *Ueberall* upon the reorganization of the corps of naval engineers in the German navy. The use of machinery had grown to an enormous extent on board warships, and the engine-room *personnel* was not equal to the requirements. A change, therefore, became necessary, and the interim period between the end of the old system and the beginning of the new ended on October 1, when the latter came into operation. The young man who wishes to enter the engineering branch must not be more than twenty-one years of age; he must have the qualification of a one-year volunteer; and he must pass through a three-months' preliminary training as an "Anwärter" or probationary student, and be selected by the chief of the port to which he belongs. He then undergoes a practical and theoretical entrance examination, and his father or guardian is responsible for the expenses, and contributes a monthly sum of forty marks until the candidate attains the rank of engineer "Applikanten." When the young man has been an "Anwärter" for three months' training on shore, he passes to a ship of the Home squadron for nine months, after which there is an examination with promotion to the rank of "Applikanten." Then comes a separation of duties, those who propose to become torpedo-engineers being attached for twelve months to the torpedo divisions at the port. The various changes which have been made in regard to training and promotion have considerably expedited both. Under the old state of things the candidate became an engineer in fifteen years; the time has now been reduced to nine years. To attain the rank of chief engineer will now occupy twelve or thirteen years instead of nineteen, of staff engineer eighteen years instead of twenty-four or twenty-five years, of chief staff engineer twenty-four years instead of thirty, and of chief or fleet engineer twenty-eight or thirty years instead of thirty-five years. The writer of the article from which these facts are taken has no great faith in the new British system. He says that the duties of engineer and executive officers differ very greatly from one another, and that each must absorb the full attention of a man. The demand of first-rate engineers will not cease, and the writer believes that they are not likely to be produced by the British system, although he thinks the executive officers will greatly benefit by it.—*Army and Navy Gazette.*

GREAT BRITAIN.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Africa	16,350	Chatham.	Building.
Britannia	16,350	Portsmouth.	"
Hibernia	16,350	Devonport.	"
Hindostan	16,350	Clydebank.	Launched Dec. 18, 1903.
New Zealand	16,350	Portsmouth.	Launched Feb. 4, 1904.
Commonwealth	16,350	Glasgow.	Launched May 13, 1903.
Dominion	16,350	London.	Launched Aug. 25, 1903.
King Edward VII	16,350	Devonport.	Launched July 23, 1903.
Queen	15,000	"	Under trial.
Prince of Wales	15,000	Chatham.	" "

VESSELS BUILDING—*Continued.*

Name.	Displacement.	Where Building.	Remarks.
Armored Cruisers.			
Duke of Edinburgh	13,500	Pembroke.	Building.
Black Prince	13,500	Blackwall.	"
Warrior	13,500	Pembroke.	"
Cochrane...	13,500	Glasgow.	Ordered.
Natal	13,500	Barrow.	"
Achilles.....	13,500	Newcastle.	"
Hampshire.....	10,700	Elswick.	Launched Sept. 24, 1903.
Devonshire.....	10,700	Chatham.	Building.
Roxburgh..	10,700	Glasgow.	Launched Jan. 19, 1904.
Argyll	10,700	Clydebank.	Launched Oct. 8, 1903.
Carnarvon.....	10,700	Greenock.	Launched March 3, 1904.
Cornwall	9,800	Glasgow.	Launched Oct. 7, 1903.
Suffolk	9,800	Pembroke.	Under trial.
Lancaster	9,800	Portsmouth.	"
Protected Cruisers.		Elswick.	Under trial.
Encounter	5,880	Devonport.	Launched June, 1902.
Topaz.....	3,000	Birkenhead (Laird).	" July 23, 1903.
Amethyst.....	3,000	Elswick (Armstrong).	Launched Nov. 5, 1903.
Diamond.....	3,000	Birkenhead (Laird).	Launched Jan. 6, 1904.
Sapphire.....	3,000	Yarrow (Palmer).	" "
Gunboats.			
Cadmus.....	1,096	Sheerness.	Launched April 29, 1903.
Clio.....	1,096	"	Under trial.
Scouts.			
Adventure.....	2,750	Elswick.	Building.
Forward.....	2,545	Fairfield.	"
Pathfinder	2,610	Birkenhead.	"
Sentinel.....	2,900	Vickers.	"
Skirmisher.....	2,900	"	"
Foresight.....	2,545	Fairfield.	"
Attentive.....	2,750	Elswick.	"
Patrol.....	2,610	Birkenhead.	"

NAVY ESTIMATES, 1904-5.—The navy estimates for the year 1904-5 were issued on February 24. The most striking figures are:

Total sum required	£36,889,500
Last year	34,457,500
Supplementary estimate	1,308,000
Increase	£1,124,000
No. of officers and men, boys, coastguard and royal marines	131,100

Increase, 4000.

New Constructions:

Sum provided	£11,654,176
Last year's expenditure	11,109,614

2 battleships, 4 armored cruisers, 14 destroyers, 10 submarines.

Battleships Purchased.—Swiftsure, Triumph.

New Ships Finished, 1903-4.—Six battleships: Prince of Wales, Queen, Albemarle, Cornwallis, Duncan, Exmouth.

Nine Armored Cruisers.—Euryalus, Bedford, Berwick, Cumberland, Donegal, Essex, Lancaster, Monmouth, Suffolk.

One second class cruiser: Challenger, 2 sloops, 8 torpedoboats, 3 submarines, 1 repairing ship, 11 destroyers, 1 surveying ship.

Now Under Construction.—8 battleships, 13 armored cruisers, 1 second-class cruiser, 4 third-class cruisers, 8 scouts, 23 destroyers, 11 submarines, 1 river gunboat, new Admiralty yacht.

The increase in the cost of the navy since 1895, is shown in the following table. It will be noted that the present estimates are the largest on record:

1895	£19,637,000
1896	£21,823,000
1897	£22,238,000
1898	£23,778,000
1899	£26,594,000
1900	£28,791,000
1901	£30,875,000
1902	£31,255,000
1903	£34,457,500
1904	£36,889,500

No details are given in the shipbuilding programme of the design of ships to be constructed. The First Lord, however, states that the two new battleships will be of a type to be known as the Lord Nelson class. These will be the first battleships designed by Mr. Watts.

The British battleship programmes of the last six years compare as follows with those of other powers:

BATTLESHIPS LAID DOWN.

	1899	1900	1901	1902	1903	1904	Tl
England	2	2	3	2	3	4	16
France	0	2	0	4	0	0	6
Russia	3	1	1	1	6	0	12
Germany	3	2	2	2	2	2	13
United States	3	2	0	2	5	1	13

The armored cruisers, four in number, will, it is understood, be of the type of the Duke of Edinburgh, armed with six 9.2-inch guns and ten 6-inch, and steaming 22¼ knots.

It has been decided not to proceed with the three third-class cruisers provided in last year's programme.

CHANGES AND DEVELOPMENTS.—Short Service.—The introduction of short service for a part of the navy has met with success. The full number of 625 stokers and 375 seamen will have been enlisted before the end of the financial year for a short term of service, with a longer service in the reserve. A like number is to be raised this year.

Royal Fleet Reserve.—The royal fleet reserve shows very satisfactory progress, and already numbers 8,375 men.

Royal Naval Volunteer Reserve.—Two thousand men of the Royal Naval Volunteer Reserve are now enrolled on the Thames and on the Clyde.

Naval Intelligence.—The Naval Intelligence Department is being steadily developed. One naval attache and seven officers have been added to the department.

Home Squadron.—The fleet in Home waters will shortly be composed of four battleships of the Royal Sovereign class, and of a faster division consisting of two ships of the Duncan class and the two ships purchased from Chili.

REASONS FOR LARGE EXPENDITURE.—In introducing the estimates, the Board of Admiralty state that "they are well aware that the charge they are asking Parliament to sanction is a heavy one, but Parliament must remember how heavy is the responsibility cast by it on the Board of providing the country with a navy strong enough to sustain a struggle with the navies of any two powers, and also strong enough to ensure reasonable security to its vast seaborne trade and to the food supply of the people."

"They have avoided, and will avoid, giving any stimulus to the expansion of armaments by the formulation of large programmes of construction, but

when such programmes are adopted by other powers they have no choice but to take them into account in framing their own shipbuilding policy." —*United Service Gazette.*

The First Lord of the Admiralty issued on February 24, a statement giving a summary of the navy estimates for 1904-5. We are glad to see that in future the boys in the training ships will no longer receive any instruction which is solely applicable to the management of sailing ships, and that in place of the training they have hitherto received on masts and yards there has been substituted a more extensive training in gunnery and an elementary training in mechanical and stokehold work. The entry and training of boy artificers is proceeding satisfactorily. Not the least remarkable innovation is the fact that proficiency in the use of mechanical tools and in stokehold work will in future form part of the examination for the rating of able seamen, and the course of teaching of ordinary seamen has been readjusted accordingly. This is the fullest recognition possible of the fact on which we have so often insisted, that the modern war vessel is a machine and must be dealt with as such, and not a "ship" in the old sense of the word. A complete system of physical and gymnastic training has been introduced into the fleet, and a scheme for the training and organization of naval bands has been promulgated, and the work has commenced.

Steady progress has been made during the year with the policy of reconstruction, announced in the statement of two years ago. By March 31 next, the work will have been completed in respect of the battleships Barfleur and Centurion, and of the battleships of the Royal Sovereign class, except the Repulse, which is in hand, and the Hood, in which ship, owing to the different conditions of stability arising from the fact that she alone of the class possesses turrets, the Director of Naval Construction is not able to advise casemating the upper-deck 6-inch guns. The work has been completed on the Powerful and Terrible, and on the following second-class cruisers: Fleet ram class:—Furious, Arrogant.
And Talbot class:—Juno, Doris, Venus, Dido, Isis.

During the year 1904-5 it is expected that work on Gladiator and Vindictive—Fleet ram class—and Eclipse, Diana, Talbot, Minerva—Talbot class—will be completed.

The experiments with oil fuel have continued without a day's intermission, and Lord Selborne thinks that it can be accurately stated that in no country has greater attention been given to this subject, or the experiments been more exhaustive. The progress has been slow but sure; it is not a matter which can be hurried; the great difficulties connected with the satisfactory use of oil in ships of war can only be overcome by patience and continual experiment; the experience gained with the Mars and Hannibal in the Channel fleet with their cylindrical boilers has been utilized in respect of the Belleville boilers of the Bedford, which has now been commissioned for service in the Channel fleet. Simultaneously with the experiments in the use of oil fuel, the question of its storage and supply is being carefully studied.—*Engineer.*

The first keel plate of the new battleship Africa was laid at Chatham on Wednesday, and only the Portsmouth ship now remains to be commenced. A large number of men have got to work on the new vessel, and the officials fully expect to expend the whole of the £24,000 allowed for the work up to March 31. From Devonport also rapid progress with the Hibernia is reported, and while it is not proposed to establish any new records, steady work is to be kept up in order that the vessel may be ready for service in a reasonable period. The orders for the engines for these vessels have been placed: Those for the Hibernia are to be built by Messrs. Harland and Wolff, for the Africa by John Brown, and for the Britannia by Humphreys, Tennant and Co.—*Army and Navy Gazette.*

The three new first-class battleships of 18,000 I. H. P., the Britannia, the Hibernia, and the Africa, for which contracts have been placed by the Ad-

miralty, are to be fitted with water-tube boilers of the Babcock and Wilcox type. Each vessel will have 18 boilers of a total heating surface of about 40,000 square feet and a total grate area of 1,250 square feet, Messrs. Babcock and Wilcox have also received the order for the boilers for the Italian first-class battleship Napoli of 19,000 I. H. P. The vessel will have 22 Babcock and Wilcox boilers, having a total heating surface of 56,200 square feet and a total grate area of 1600 square feet.

The Admiralty is not only extending the installations of oil fuel furnaces in existing warships, but is providing for the consumption of liquid fuel by vessels soon to be constructed. The Britannia, which is to be built at Portsmouth, will be started in March, and an order has been issued that her double bottom is to be specially constructed to hold oil fuel. The sister-ships of the Britannia (the Hibernia and Africa) are also to be provided with tanks in the double-bottom sections, and probably new ships of other classes will be similarly built. The details connected with the construction and rivetting of the double-bottom sections have recently been the subject of precise instructions from the Chief Constructor's Department at Whitehall.—*United Service Gazette.*

The experiments which have been conducted with the ten submarines of the Holland-Vicars type, built at Barrow for the navy, have been of so successful a character, and have so fully demonstrated the usefulness of these small craft as instruments of war, that the Admiralty are contemplating the construction of a large flotilla at the earliest possible date. At present nine submarines are being built at Barrow, and a tenth is being designed, which will make 20 built at Barrow for the Admiralty. The nine now in course of construction will be launched about the end of March. It is then proposed to build 27 more submarines in batches of nine at a time, and to complete them with as much celerity as possible, as once it has been demonstrated that submarines are a useful adjunct to a navy it is of imperative importance to the largest navy in the world that a large flotilla of this type of vessel shall be at the command of the Admiralty and attached to British squadrons wherever they are stationed. It is evident that in the future submarines will play an important part in all naval engagements.

The Leander, second-class cruiser, which has been converted into a seagoing base ship for torpedo-boat destroyers, was commissioned at Chatham on Thursday for service in the Mediterranean as a depot ship to cruise with the destroyers attached to the Mediterranean fleet. The Leander was selected for this service two years ago, and has undergone extensive alterations to fit her for her new duties. Her main armament of ten 6-inch guns has been removed, and she has now only six small quickfiring guns, as she is not intended for offensive purposes.—*United Service Gazette.*

The Gladiator, which recently returned to Portsmouth from the Mediterranean, is to be paid off into the D division of the Dockyard Reserve, which means that she is to have a thorough refit, including the substitution of 6-inch for her 4.7-inch guns. The recent rearming of a number of cruisers is a tacit acknowledgment that they have hitherto been undergunned, and the action of the Admiralty is a tardy confession of this fact.—*United Service Gazette.*

The *Times* has reason to believe that it is the intention of the Admiralty to commission the Triumph and the Swiftsure, the two battleships purchased from the Chilians, for service in the Home fleet, as soon as the necessary cordite ammunition for their guns, which are not of the existing service pattern, can be provided. Beyond the provision of torpedo nets, which they did not possess, the ships will undergo no alteration whatever, in order that the utmost advantage may be taken of the opportunity of comparing them, while working under service conditions with modern battleships built for the British navy. The experiment will be highly interest-

ing, and, conducted, as it will be, under the command of Vice-Admiral Sir Arthur Wilson, V. C., who has recently served as Comptroller of the Navy, it is likely to yield valuable lessons.—*United Service Gazette.*

A new 14-inch torpedo-tube is to be fitted in the ships of the King Edward VII, Devonshire, and Antrim classes now being built. It is claimed that the torpedo for which these are intended is a distinct improvement upon previous types in respect of weight of projectile discharged, and also in matters of speed and range.—*United Service Gazette.*

The council of the Royal United Service Institution having decided that a gold medal be granted annually for the best essay on a naval or military subject, announce that the following is the subject for the essay this year: "The Best Method for Carrying Out the Conjoint Practice of the Navy and Army in Embarkation and Disembarkation for War, Illustrated by the Experience of the Past." The council hope that officers belonging to both service will compete. There is no objection to officers of the two services collaborating, as probably the value of the essay will be enhanced by such conjoint work; in this case, however, only one officer can receive the medal. The successful competitor will also receive the Trench Gascoigne prize of thirty guineas, and a similar sum will be awarded to the writer of the essay next in order of merit.

Notice is given by the Admiralty that at the examination for cadet-ships at the Royal Naval College, Osborne, which will take place in July next, the following changes will take effect: The syllabus of the examination will be simplified. The option previously given will disappear, but Latin will be retained as one of the subjects of examination. History and geography will be combined in one paper. Arithmetic and algebra will also be combined in one paper, about two-thirds of which will be devoted to arithmetic. These changes are made with the object of bringing the examinations more completely into line with the work of ordinary preparatory schools. The revised syllabus will be as follows: 1, English; 2, history and geography; 3 arithmetic and algebra; 4, geometry; 5, French or German, with an oral examination, and 6, Latin. Candidates will take all six papers, but a fixed standard of qualification in each subject will not be required, provided that the general standard of the candidate in other subjects is satisfactory.—*United Service Gazette.*

GUNNERY AND TORPEDO TRAINING IN THE NAVY.—The Admiralty, in circular letters dated December 18, announce new regulations for the training in gunnery and torpedoes of lieutenants, seamen, and marines, making a further step in the great work of reform initiated by the Admiralty on Christmas Day last year. The complete scheme was then referred to in summary, and gradually the detailed official orders have been issued. From the admiral's bridge down to the stokeholds, the whole regime of the fleet is being largely remodelled, the new and scientific replacing the old and antiquated which had survived from the days of sails and wood. The Admiralty have recast the methods of training officers and men in the hope of fitting them better for their specialized scientific duties without robbing the service of any of those sterling characteristics which are its distinctive features. The authorities have aimed to prune the ancient system of all that has become unnecessary and graft on to it a new order of things more in keeping with the needs of a modern fleet whose fighting efficiency requires the same high qualities of courage, resource, and endurance as in the past, and in addition, intimate familiarity with the delicate mechanical instruments with which the next naval war must be fought.

The fate of a fleet will depend largely on the efficiency of the gunners—officers and men—and the torpedo staff. Under the new scheme, lieutenants who desire to qualify in gunnery or torpedoes will apply to the Admiralty, and those selected will go through a course at one of the schools,

lasting fifteen weeks, and be graded in two classes according as they obtain 85 or 70 per cent of marks respectively. Certain officers will then be selected from those successful at this examination for a further course lasting thirty-seven weeks, and from these again, after examination, a selection will be made of officers, who will proceed to the Naval College at Greenwich for an advanced course. By this means the fleet will obtain three grades of officers, according to their achievements, who will be designated, and receive extra pay (an advance on the present scale), as follows:

Lieutenants G† and T† (advanced course).....4s. a day.
Lieutenants G and T (second course) .....3s. a day.
Lieutenants G* and T* (short course).....2s. a day.
Other lieutenants appointed for gunnery duties in ships where a gunnery lieutenant is allowed but not borne (as at present).....1s. day.

Existing gunnery and torpedo lieutenants will continue to receive gunnery and torpedo allowances at their present rates, while holding appointments for the special duties, but they will be entitled to the new rates upon requalifying under the new conditions.

Lieutenants who have qualified in gunnery and torpedo will be appointed to the gunnery and torpedo schools every three years for a three months' requalifying course.

The bluejacket of the future must be not less the good seaman of the past, but every A. B. will be required to be a mechanician as well. In his qualifying examination he will have to obtain 70 per cent of the maximum marks in the following subjects:

(1) Seamanship.
(2) Torpedo (all the simple duties in the torpedo flat, and the management of searchlights, incandescent lights, use of telephone and speaking tube, electric firing apparatus, motor switches, torpedo dropping gear, and outrigger drill).
(3) Gunnery, sixteen days' course (drill at all guns in the ship, stripping and assembling the pieces and their mountings, the "dotter," Captain Percy Scott's ingenious practice machine, deflection teacher, swinging targets, and loading teacher).
(4) Field gun training (nine days' course).
(5) Stokehold work.
(6) Use of mechanical tools.

The aim is to make the bluejacket more of a handy man than he is at present—a unit of the ship, who can fire a gun, discharge a torpedo, become a soldier ashore, go into the stokehold if need arises, or use any tool in carrying out simple repairs such as are likely to be required in action. In an emergency, a bluejacket—every A. B. will be known as a "Trained Man"—should be equal to the occasion. This training will be carried out, not in the "schools" as at present, but in sea-going ships or in the barracks at the naval ports. The qualification of "Trained Man" will be the ordinary ruck of the navy, and the "schools" will be reserved for men who become specialists in gunnery or torpedo work. Men who go through a more advanced course will be rated seamen gunners or seamen torpedo men, as the case may be, and from these others will go forward to qualify for higher rating. Seamen gunners who show marked proficiency in shooting will be retained in the schools to qualify as gun-layers and gun-sighters. One important reform is noted in the following paragraph, which aims at enabling men to learn to work together quickly in battle:

At the conclusion of the gun-layer's course, each gun-layer will be associated with a sight-setter, and they will be trained together in the gunnery school and exercised generally until required for a draft. Upon notice being given that a ship in the fleet reserve or a ship to be commissioned will require gun-layers or sight-setters, the requisite number of couples will be given special drill at the pattern of gun that they will find on board the ship to which they are detailed. If the type of gun requires a trainer

as well as a gun-layer and a sight-setter, a S. G. will be appropriated to each couple, and the trio thus formed will be thoroughly drilled before being drafted.

Appended to the new regulations are the amended scales of extra pay per day, which will be allowed to non-substantive gunnery and torpedo ratings.

GUNNERY.

Trained Man	1d.
Seaman Gunner	4d.
Sight-setter	6d.
Gun-layer	10d.
Turret Sight-setter	10d.
Turret Gun-layer	1s.

TORPEDO.

Seaman Torpedo Man (S. T.)	4d.
Leading Torpedo Man (L. T. O.)	10d.
Torpedo Coxswain (T. C.)	1s. 0d.
Gunnery Instructor (G. I.) (in addition to any one	
Torpedo Instructor (T. I.)	1s. 8d.
of the allowances as sight-setter, gun-layer, or turret sight-setter or gun-layer) a day	8d.

In the case of the higher ratings, these rates of pay mark an advance, so that in future the best men of the big guns of the fleet will receive more adequate pay, in addition to the opportunity of gaining the King's medal, with the bonus attached. The rates of pay for Royal Marine officers and men have also been adjusted to the new scales.—*United Service Gazette.*

TRAINING BOYS FOR THE SEA.—Admiral Sir J. C. Dalrymple Hay, lecturing on the 14th inst., at the Royal United Service Institution, on "The Necessity of Training Boys for the Sea Service," said that until the middle of last century no Admiralty plan existed for training men for the navy. The mercantile marine was the source from which these men were drawn, but it trained no men for the navy now, and did not even train enough seamen for its own purposes. To the late Admiral Lord Fitzhardinge belonged the credit of inducing the country to man our ships fully and train boys for the navy. At present 83,000 seamen were employed in the navy, who had been entered as boys on training-ships at the age of fifteen or sixteen, who then engaged to serve until they were thirty years of age, and might afterwards re-engage until they were forty. Of every hundred who completed their engagement to thirty years of age, sixty-five re-engaged until they were forty, twelve rejoined at a later period, and twenty-three were lost to the navy. The Naval Reserve was the only trained force on which we could rely for manning the additional ships now being completed. He deplored the increase of foreigners employed in the navy and the decrease of British seamen in the mercantile marine. The returns for 1902 showed that 253,540 persons were employed afloat in the home and foreign trade. Of this number, 39,177 were Asiatics and Lascars, 39,825 were foreigners, and only 174,538 were British. They heard a great deal about the unemployed. The best way to deal with the unemployed was to make the service on the seas more attractive. Mr. Ritchie in 1900 admitted that too large a number of seamen on our ships were foreigners, but he did not accept the responsibility of providing a remedy. In Admiral Dalrymple Hay's opinion, the remedy was to adopt for our merchant navy the same training of our boys which had made the seamen of the Royal Navy, men of whom the nation was justly proud. As an annual entry of 4700 boys was sufficient to keep up the number of 83,000 for the navy, a further entry of 9500 boys would supply the 175,000 required for the mercantile marine. The State should step in and do for the merchant service what it had already done for the Royal Navy. The 40,000 foreigners whom our mercantile marine now trained would have to leave it on an

outbreak of war, and there were no British seamen to take their place. It would surely be possible for the Admiralty to consider the best mode of training some of our boys for the mercantile marine, to provide a real British reserve for the navy, and to get rid of the disgrace of having foreigners to man our merchant navy. He favored the adoption of the recommendation of the commission presided over by Mr. W. Shaw Lindsay in 1859, that training-ships should be placed along our coasts with 200 boys in each. They would require 100 of these ships—10 for Scotland, 10 for Ireland, and 80 for England and Wales. Boys sent to them should be volunteers, physically fit, who, having passed the sixth standard, should be enlisted in the same way as the boys in the navy. They would thus become a real naval reserve, and we should have a merchant navy in good order and discipline, instead of foreigners, who now took the bread out of the mouths of forty thousand of our fellow-subjects.—*United Service Gazette.*

NAVAL OFFICERS.

NEW CONDITIONS OF SERVICE.—An important circular letter has just been issued by the Admiralty to all commanders-in-chief, captains, commanders, and commanding officers of His Majesty's ships and vessels. The terms of the letter, which is dated December 11, are as follows:

CHANGES IN REGULATIONS.

My Lords Commissioners of the Admiralty, having had under consideration the conditions of service of officers of the various ranks of the military branch of His Majesty's fleet, with particular reference to the ages at which the officers come upon the various lists, have decided to make the following changes in the regulations governing (1) Retirement for non-service. (2) Optional retirement. (3) The retired pay of captains. (4) Civil employment. My Lords have also decided (5) to limit the period during which officers may be employed on shore, and (6) to make certain additions to the authorized establishment of flag officers, and accelerate the periodical increases at present being made in the numbers of officers in the various ranks.

NON-SERVICE RETIREMENT.

The periods of "non-service" that entail compulsory retirement in the ranks of flag officer, captain, commander, and lieutenant are reduced according to the following rules, to take effect as regards all officers promoted to the rank of flag officer or to the other ranks mentioned from December 8, 1903:

Admirals.—To be retired as soon as five years have elapsed since their last "service" after attaining flag rank.

Vice-Admirals.—To be retired as soon as five years have elapsed since their last "service" after attaining flag rank, or on promotion to the rank of admiral if they have not served while holding rank of vice-admiral.

Rear-Admirals.—To be retired so soon as three and a half years have elapsed since their last "service" while holding rank of rear-admiral, or, if they have not thus served, so soon as three and a half years have elapsed since their promotion to rear-admiral or when five years have elapsed since their last "service" while holding rank of captain.

Flag Officers Generally.—Any admiral, vice-admiral, or rear-admiral whose flag has not been hoisted during a period of seven years to be retired at the expiration of such period.

Captains.—To be retired so soon as three years have elapsed since their last "service" while holding rank of captain or, if they have not thus served, so soon as three years have elapsed since their promotion to rank of captain.

Commanders and Lieutenants.—To be retired so soon as three years have elapsed since their last "service" after attaining their existing rank, or, if they have not served while holding that rank, so soon as three years have elapsed since the date of their promotion.

OPTIONAL RETIREMENT.

From December 8, 1903, flag officers, captains, and commanders will be allowed the option of retiring at any age, at the discretion of their Lordships, with retired pay as provided in the regulations.

RETIRED PAY OF CAPTAINS.

The scale of retired pay for captains, according to age and service, is revised as follows:

(*a*) Officers who are retired at the age of fifty-one years or over will receive an addition to their retired pay for every full year's service (within a maximum of five years) in excess of the periods specified in the existing scale at the rate of £15 a year, instead of £10 a year as at present. (Note.—This rule is introduced so that captains on reaching the age for compulsory retirement may have the maximum retired pay of their rank, £600 a year, irrespective of the receipt of a good-service pension.)

(*b*) No captain will be allowed to receive any addition to his retired pay on account of a good-service pension held by him on retirement, except in case of retirement for ill-health caused by the service. In such cases officers will receive, at the discretion of their Lordships, an addition ranging from a minimum of £50 to a maximum of £150, and the increase over the minimum will be at the rate of £15 for each year's service in excess of twenty years. In no case, however, will the retired pay of a captain be allowed to exceed £600 a year.

(*c*) A captain will be entitled to a minimum rate of retired pay of £425 a year, provided that he is forty-five years of age and that he has served as captain for three years, of which two must have been in command of a ship-of-war at sea.

These rules will take effect from December 8, 1903, subject, as regards (*b*) to the provision that the existing rights of captains holding such good-service pensions shall be maintained.

CIVIL EMPLOYMENT.

From December 8, 1903, inclusive, "civil employment" as defined by existing regulations including service as naval attache, will be considered as service to prevent compulsory retirement.

SHORE EMPLOYMENT.

From December 8, 1903, no officer will be allowed to hold an appointment or appointments that may be defined by their Lordships to be "shore employment" for more than five consecutive years, or in the case of members of the Board of Admiralty for more than seven consecutive years, except under special circumstances which may in the opinion of their Lordships justify an extension of the appointment in particular cases. (Note.—Officers now holding shore appointments may, however, be permitted to retain them until the expiration of the terms for which they were appointed.)

In calculating the period of employment on shore, time on half pay will be included. Temporary employment in any capacity during naval manœuvres will not qualify an officer for a further period of employment on shore.

NUMBER OF OFFICERS.

The future establishment of flag officers on the active list will be as follows: Admirals of the fleet, 3; admirals, 12; vice-admirals, 22; and rear-admirals, 55; total 92. The increase over existing numbers will be made by annual installments and will be completed by the end of the year 1907.

The present authorized rate of increase in the captains' and commanders' list will be accelerated as follows:

Captains.—An increase of eight in each of the years 1903, 1904, and 1905, and seven in each of the two following years up to the authorized maximum number of 253.

Commanders.—An increase of nine in each year, commencing with the year 1903, until the authorized maximum number of 373 is reached.

These increase will take effect as from July 1, 1903.

—*United Service Gazette.*

MANŒUVRES OF 1903.—A blue-book (Cd. 1824) has been issued dealing with the manœuvres carried out in August 1903, by the combined Mediterranean, Home, and Channel fleets, together with the Cruiser squadron.

The general idea was that a contest for the command of the sea had for some time been in progress between two maritime countries, B and X. Between Gibraltar and Madeira X had been victorious, and B driven with loss into his defended port at Madeira. In northern waters, however, B had been victorious, and was able to send a force (B 1) south, in order to combine with his available forces (B 2) at Madeira, and then to engage X, known to be concentrating at Lagos. The admiral in command of B 1 had instructed his junior, the admiral commanding B 2, by cable. The admiral commanding X fleet, while preparing for sea at Lagos, heard that three squadrons belonging to B had sailed from Berehaven and Portland, obviously with the intention of joining at sea and effecting a junction further south with the fleet preparing for sea at Madeira.

By the general orders all cruisers were free to sail at 8 a. m. on August 5, as also were the B 2 battleships (Home fleet) under Vice-Admiral Sir A. K. Wilson. The B 1 battleships (Channel fleet) under Vice-Admiral Lord Charles Beresford could leave Madeira at noon on August 6. The X battleships (Mediterranean fleet) under Admiral Sir C. Domvile were free to leave Lagos at 4 a. m. on August 6. All ships sailed at the times indicated.

The report of the umpires sums up the various narratives and decides as follows:

"The problem of the junction of B 1 and B 2 had two aspects, the one in which the highest speeds of the B 1 and B 2 squadrons would just enable them to meet at a point near the Azores, which X fleet at its highest speed might or might not be able to reach first; the other in which the junction would be effected, by strategy, at any other point within the limits made by the first case. B admiral, trusting to the speed of his ships, chose the westernmost point which he and B 2 could attain in a given time, and which calculation showed that X could not reach first unless he steamed there direct at 16 knots.

"As X fleet never was, at any time of the manœuvres, able to go 16 knots, the junction took place without hindrance near to the appointed rendezvous, and only about two hours later than the estimated time. But even if X fleet had been able to steam 16 knots, it would not have prevented the junction, because of a deviation which the X admiral made from the shortest line in order to pass through his central rendezvous. The X admiral had provided for a junction at any other point, and had planned to shape his course on the information he received from his cruisers. The one sure thing that he had in his favor was that his fast cruisers could be at Madeira before B 2 left it, and they were.

"If information reached him from them promptly, the plans he had laid down might have enabled him, at 16 knots, to run down B 2 before the junction took place, provided B 2 had failed to maintain 14 knots. The information, in spite of the losses in cruisers caused by breakdowns, came promptly and accurately from the cruiser admiral; but X fleet lacked the speed, the junction was not prevented, and the first part of the manœuvres ended in favor of B.

"Next, in pursuance of his ultimate object, B sought for X and found him." Each fleet was short of one battleship, and the Mars, which had expended all her oil fuel, limited the speed of B to 11 knots. X, hoping first to rejoin his missing battleship, tried to avoid, and B, who had no such hope, to force an action. B was between X and his reinforcement, and so far succeeded that he tempted X to engage his leading division

while keeping on at his highest speed. During this action the fleets were moving approximately parallel to each other on a semi-circular course, B having the interior position, and X endeavoring to sweep around in order to join his reinforcement.

"B strove hard to keep in touch with X by ordering what was practically a general chase of X's rear division; but when he found that his fleet was being drawn out and separated, and that he was unable to prevent X's passing out of his reach, he discontinued the action.

"The result of the general engagement was that on B's side three battleships, one armored and one protected cruiser were disabled, five battleships were damaged, and one protected cruiser was lost. Whilst on X's side one battleship and one armored cruiser were lost, two battleships disabled and one damaged.

"Considering, therefore, that the undamaged portion of X fleet was much superior to the undamaged portion of B; that B in effecting the junction had expended more coal than X; that B 1 was further from its base than X was from Gibraltar, and that on the morning of the 11th X had joined his missing battleship and armored cruiser, though he had lost the Venerable by a machinery breakdown, we are of opinion that at the end of the manœuvres the command of the sea in those waters still remained with X."

The approximate average speeds were: X fleet, 15 knots; B 1 fleet, 12.7 knots; B 2 fleet, 14 knots. The armored cruisers belonging to B 1 steamed from Portland to the Azores at 18 knots. Of twelve ships in all which developed engine or boiler defects, three had to return to dockyards for repairs; the rest either overcame their difficulties entirely or were able to steam for the remainder of the manœuvres at speeds varying from 12 knots (Exmouth) to 19 knots (Spartiate).

One singular phase of these manœuvres was a night action between the armored cruisers of B 1 and the protected cruisers of B 2, brought on by errors in signaling. Beyond the report of the B 1 cruiser admiral, the blue-book prints no information on this subject, and the umpires have ignored it in their report.—*The Royal Navy List.*

REORGANIZATION OF THE DESTROYER FLOTILLAS.—An important order has been issued with regard to the torpedo-boat destroyers. The Admiralty have decided, that, having regard to the fact that the destroyers on the Home station will be under the command of the commander-in-chief of the Home fleet in time of war, it is considered desirable to give him a general control over them in time of peace. Their Lordships have, therefore, approved of the following alterations being made in the organization of the flotillas to take effect from the 1st of January.

All destroyers in commission for service at home, except tenders to the gunnery and torpedo schools, will in future be under the command of the commander-in-chief of the Home fleet, and as soon as the necessary arrangements can be made, those in the fleet reserve will also be placed under his orders. The headquarters of the three flotillas will be Portland, with the Invincible as depôt-ship; Felixstowe, with the Audacious as depôt-ship; and Devonport, with the Triumph as depôt-ship, at which ports respectively the three ships will be berthed; and moorings for the destroyers in commission and reserve will be provided. On the completion of the Invincible, at the end of January, she will be commissioned with the officers and men of the Warrior, and will remain at Portsmouth until the destroyer-pen and the additional moorings at Portland are ready. The Invincible will then be transferred to Portland, which will become the base for the present Portsmouth flotilla. The post of inspecting-captain of torpedo-boat destroyers will be abolished, and a captain will be specially appointed for duty with the Home fleet destroyers. This officer, who will, for the sake of convenience, be designated Captain (D.) Home fleet, will eventually be in command of the Invincible; but until that ship is ready he will be appointed to the command of the Warrior, in succession to

Captain Erskine. A senior lieutenant or junior commander will be appointed to the Invincible, to act as executive officer in all matters relating to the depôt and as assistant to the captain. The Triumph and Audacious will each be commanded by an officer junior to the officer commanding the respective flotillas, and they will, therefore, be senior lieutenants or junior commanders. The captain (D.) will have a small vessel at his disposal, in which he can accompany the flotillas to sea, if necessary, and visit the other depôts for purposes of inspection, etc. The torpedo-gunboat Grasshopper will be detailed for this service, but will be replaced by the Halcyon when the refit of the latter vessel is completed in May, 1904, the crew of the Grasshopper turning over to her.

In order to give the captain (D.) and the officers commanding the flotilla the necessary disciplinary powers, the Audacious and the Triumph and all destroyers in commission, and also the Grasshopper, will be made tenders to the Warrior as from January 1, and transferred from the Warrior to the Invincible on the latter vessel commissioning as depôt-ship. As soon as the necessary arrangements can be made, the destroyers of the fleet reserve will be placed under the command of the commander-in-chief of the Home fleet, and attached to the three depôt-ships, when the commanding officers of the depôt-ships at Felixstowe and Devonport and the second in command of the Invincible will be responsible for their efficiency. In cases where the staff of the depôt-ships are unable to cope with all the defects, and dockyard assistance is required, arrangements for these repairs, and also for the periodical half-yearly docking, are to be made between the flotilla commander and the admiral-superintendent of the port concerned, subject to any instructions which the former may have received from the commander-in-chief of the Home fleet or from the captain (D.).—*Royal United Service Institution.*

ITALY.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Roma	12,625	Gov't Yard, Spezia.	Building.
Napoli	12,625	Gov't Yard, Castellamare.	"
X	12,625	Gov't Yard, Venice.	Projected.
Vittorio Emanuele	12,625	Gov't Yard, Spezia.	Launched Sept. 30, 1903.
Regina Elena	12,625	Gov't Yard, Castellamare.	" Oct. 21, 1903.
Benedetto Brin	13,526	Gov't Yard, Castellamare.	Under trial.
Regina Margherita	13,526	Gov't Yard, Spezia.	Under trial.
Armored Cruiser.			
Francesco Ferruccio	7,460	Gov't Yard, Venice.	Under trial.
Torpedo Cruiser.			
Coatit	1,313	Gov't Yard, Castellamare.	Under trial.

The Italian battleship Italia is undergoing a somewhat unusual transformation. The draft of the vessel, which was 31 feet 3 inches, was a cause of considerable difficulty in navigation and entering docks and harbors. In order to obviate the defect, a double external hull is being built at a distance of 10 feet 6 inches from the original hull. Owing to this modification the beam of the Italia will be increased to 82 feet, and there is only one dock at Spezia which will be able to accommodate her. Iron or steel is to take the place of wood in the interior of the ship, and of the twenty-four existing boilers, twelve will be replaced by fourteen of the locomotive type. The secondary armament is also being changed. The reconstruction will be costly, and the ship is intended only for coast-defense work. It was intended to transform in the same way one or two other old ships, but the idea has been abandoned, the cost being great and the advantage doubtful.—*Army and Navy Gazette.*

JAPAN.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
1.....	16,500	Vickers.	Ordered.
1.....	16,500	Armstrong.	"
Armored Cruisers.			
1, 2, 3.....	9,900	.....	Projected.
Protected Cruisers.			
1, 4.....	5,000	.....	Projected.
Niitaka.....	3,470	Yokosuka.	Launched.
Tsuchima.....	3,470	Kure.	"
Otawa.....	3,000	Yokosuka.	"

Niitaka, of 3420 tons displacement, has just been finished at the navy-yard at Yokosuka. Her sister-ship, the Tschuschima, now under construction at Kure, is getting her equipment, and will be finished some time this spring.

The Otowa has recently been launched from the navy-yard at Yokosuka. Her data of construction are as follows: Displacement, 3000 tons; length, 330 feet 9 inches; breadth, 41 feet 3 inches; draft, 16 feet 4 inches; indicated horse-power, 10,000; boilers, 10 Niclausse; speed, 21 knots; armament, 2 5⅞-inch rapid-fire guns, 6 4¾-inch rapid-fire guns, 4 3-inch rapid-fire guns, 2 machine guns.

The armored cruisers Rivadavia and Moreno, built at the Ausaldo yard at Geneva, Italy, and purchased by the Japanese Government, developed 19.98 knots at full speed on 14,934 indicated horse-power. The coal consumption was: At natural draft, 3½ hours, 10.041 I. H. P., 16,874 lbs. per horse-power an hour. At artificial draft, 1½ hours, 14,934 I. H. P., 20,416 lbs. per horse-power an hour.

Both vessels have the following dimensions: Length, 357 feet 3 inches; breadth, 61 feet 3 inches; draft, 23 feet 11 inches. Coal capacity, normal, 650 tons; coal capacity, maximum, 1100 tons. The armament consists of: 1 10-inch rapid-fire gun; 2 8-inch rapid-fire guns; 10 3-inch rapid-fire guns; 14 6-inch rapid-fire guns; 4 torpedo tubes. The armor is in water-line belt 8, 6 and 2 inches, and between the barbettes 8 inches thick. The two 8-inch guns and the one 10-inch gun are mounted in 8-inch armored barbette turrets. They have two smokestacks with one ordinary mast between them. —*Nautical Gazette.*

The two Ansaldo cruisers purchased by Japan, and now named Kasuga and Nysshin, have reached Japan safely.

On January 30, the firms of Vickers, Son & Maxim and Sir W. G. Armstrong, Whitworth & Co., received formal orders to proceed as quickly as possible with the construction of two new battleships for Japan, one to be built by each company. They will be the most powerful warships in the world, having displacement of 16,400 tons, and being capable of delivering from their main artillery eleven tons of projectiles per minute.

The newly ordered Japanese battleships will, it is understood, be practically improved Mikasa, with fourteen 7.5's instead of the fourteen 6-inch secondary guns of that ship. The armor on the battery will be 7-inch.—*Engineer.*

Contracts for the construction of two battleships for the Japanese navy were signed last Saturday, one to be built by Messrs. Vickers at Barrow, and the other by Messrs. Armstrong at Elswick. The displacement will be 16,400 tons, and the armor protection will be on the same system as in the Mikasa, since adopted in the King Edward VII class, and in the Triumph and Swiftsure purchased from the Chilian navy. The new Japanese ships

will be more heavily armed than the King Edward VII class, for with the same number of guns there will be in some cases an increase in calibre, the weight of discharge being augmented to eleven tons per minute as compared with nine tons in the British ships. These new Japanese ships will be the most powerful yet put in hand for any navy. Their speed is to be between eighteen and a half and nineteen knots, and they are to be delivered within eighteen months. Thus a considerable achievement lies before the two great shipbuilding firms.—*Army and Navy Gazette.*

The strength of the Japanese fleet on the outbreak of war was as follows:

First-class battleships—Mikasa, Hatsuse, Asahi, Shikishima, Yashima, and Fuji.

Second-class battleship—Chin Yen.

Third-class battleship—Fusoo.

First-class armored cruisers—Asama, Tokiwa, Idzumo, Iwate, Yakumo, Adzuma, Nysshin, and Kasuga.

Protected cruisers (without gun protection)—Chitose, Kasagi, Takasagi, Yoshino, Akashi, Suma, Akitsushima, Idsumi, Chiyoda, Hashidate, Itsukushima, Matsushima, Naniwa, and Takachiho.

Torpedo avisos—Tatsuta, Chihaya, Akasaki, with twenty 30-knot speed destroyers and sixty-eight sea-going and first- and second-class torpedo-boats.

Of these ships, the first four are improved Majestics, but of slightly larger dimensions, being vessels of about 15,000 tons; the I. H. P. of the Japanese vessels, however, is nearly 3000 greater, which has given them a speed of between 18 and 19 knots. The armament is almost identical with that carried now by the bulk of English battleships, except those of the latest type, viz., the King Edward VII and her sisters, and consists of four 12-inch guns in barbettes, one forward and one aft; fourteen 6-inch Q. F. guns in casemates (in the Mikasa there is a central armored battery instead of casemates), with twenty 12-pounders and some smaller Q. F. and machine guns.

The Yashima and Fuji are somewhat smaller vessels, but they have a speed of 18.5 knots, and their armament is the same as far as the heavy guns are concerned; but they have four fewer 6-inch guns, and only sixteen 12-pounders instead of twenty. For practical purposes these six ships form an homogeneous squadron, and are, on the whole, superior in speed and slightly so in gun power to any of the six out of the seven Russian battleships opposed to them. The second-class battleship Chin-Yen was taken from the Chinese during the war of 1894-95; she is a vessel of 7350 tons; but has only a speed of 14.5 knots; she is fairly well protected, having a partial armored belt of 14-inch compound armor, with 14-inch transverse bulkheads, while the redoubts and barbettes have 12-inch armor; her armament consists of four 12-inch guns, four 6-inch Q. F. guns and some small Q. F. and machine guns. She is, however, no match for even the smallest of the Russian battleships, while the Russian armored cruiser Gromoboi would also probably make short work of her. The Fusoo, the other ship mentioned, is for practical purposes of no fighting value.

The first-class armored cruisers are a practically homogeneous squadron, vessels of 9750 tons displacement, well protected, well armed, and possessing a high speed of from 21 to 22.5 knots. Their armor protection consists of a complete 7-foot deep water-line belt of hard Krupp steel, tapering at the bow and stern to 3.5 inches; above this is a citadel 250 feet long, protected by 5-inch armor with 3.5-inch transverse bulkheads, while the barbettes for the 8-inch guns and the casemates for the 6-inch guns are of 6-inch steel, with 3-inch ammunition tubes. They carry four 8-inch Q. F. guns in two barbette-turrets, with fourteen 6-inch Q. F. guns, twelve 12-pounder and some smaller Q. F. guns. Four of these ships were built at Elswick one, the Yakumo, at the Vulcan Yard, Stettin, and the sixth, the Adzuma, at St. Nazaire; but they were all built from the designs of Mr. Watts, the present chief instructor of the navy, but at that ime (1898) the head of the construction department of the Armstrong firm.

Of protected cruisers the Japanese possess sixteen, none of them, however, of more than 4300 tons displacement; four of these, however, have a speed of from 22.5 to 23.5 knots; in addition there are eleven small unprotected cruisers. Her torpedo flotilla consists of three torpedo-gun vessels with a speed of 21 knots; twenty 30-knot destroyers, eleven torpilleurs de haute mer, and fifty-seven first- and second-class torpedo-boats, while under construction are five more torpilleurs de haute mer, about which no details are as yet forthcoming. The destroyers and first-class torpedo-boats carry three tubes, which fire the 18-inch torpedo, with an explosive charge of 171 pounds of guncotton. The effective range of a Whitehead torpedo is now well over 2000 yards, and its speed for the first 800 yards is 30 knots, after which it gradually decreases; it is kept on its course by means of a gyroscope, the action of which prevents deflection from the line of fire—an intsrument which has now been brought to a great pitch of accuracy.

THE NYSSHIN AND KASUGA.—The two new armored cruisers Nysshin and Kasuga, which have been purchased from the Argentine Government, were ordered early in 1902 from the firm of Messrs. G. Ansaldo & Co., of Sestri Ponente, by that Government when a strained state of affairs existed between the neighboring republics of Chili and Argentina. Japan decided to purchase the two Italian-built vessels in December last, and the work of completing and fitting them out was most expeditiously done, principally by the firm of Sir W. G. Armstrong, Whitworth & Co., who are responsible for the armament; they left for their destination on the 9th ult., arriving of Yokosuka on the 15th inst. They belonged to the Garibaldi class.—*United Service Institution.*

RUSSIA.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Emperor Paul I.....	16,000	St. Petersburg. (Baltic Yard.)	Building.
Admrl Pervosvannui..	16,000	St. Petersburg. (Galernoy Island.)	"
X.....	16,000	.....	Projected.
X.....	16,000	.....	"
X.....	16,000	.....	"
EmperorAlexanderIII.	13,516	St. Petersburg.	Under trial.
Borodino.....	13,516	"	"
Orel.....	13,516	"	"
Knias Suvarof.....	13,516	"	"
Slava.....	13,516	"	Launched Aug. 29, 1903.
Bunak.....	12,500	Nicolaiev.	Building.
X.....	12,500	"	"
Ivan Blatoust.....	12,500	Sevastopol.	"
Coast Defense Iron Clad.			
Admiral Boutakof.....	6,000	St. Petersburg.	Building.
Protected Cruisers.			
Oleg.....	6,750	St. Petersburg.	Launched Aug. 27, 1903.
Kagul.....	6,750	Nicolaiev.	Launched June 2, 1903.
X.....	6,700	"	Building.
Otchakof.....	6,750	Sevastopol.	Under trial.
X.....	6,750	"	Building.
Vitiaz.....	6,750	St. Petersburg.	Building.
X.....	6,750	"	"
Boyarin.....	3,200	Copenhagen.	Under trial.
Kalgoula.....	3,200	Nicolaiev.	Building.
Almaz.....	3,200	St. Petersburg.	Launched June 2, 1903.
Izumrud.....	3,200	"	Launched Aug. 27, 1903.
Izumrud.....	3,200	"	Launched Oct. 24, 1903.
X.....	3,200	Dantzic (Schichau).	Building.
X.....	3,200	St. Petersburg.	Projected.

It is announced that the Ministry of Marine has under consideration plans for a new type of armored cruiser, possibly that to which the three vessels of this year's programme are to belong. The displacement is stated to be 16,000 tons and the speed 22 knots. The proposed distribution of the armament is noteworthy. All the 6-inch and 8-inch guns will be placed in ten armored turrets, and the armor-protected side will be very extensive. The vessels of this type are intended for service in the Far East.—*Page's Magazine.*

The Russian fleet in the Far East at the outbreak of hostilities on the 8th inst. consisted of the following ships:

First-class battleships—Tsarevitch, Retvisan, Sevastopol, Poltava, Petropavlovsk, Peresviet, and Pobieda.

First-class armored cruisers—Gromoboi, Bayan, Rossia, Rurik.

First-class protected cruisers—Variag, Askold, Pallada, Diana, Bogatyr.

Third-class protected cruisers—Boyarin, Novik, Rasboinik, Djigit, Zabiaka, Vsadnik, Haidamak.

Gun-vessels and gunboats—Giliak, Gremiashchi, Otvajny, Koreĕts, Bobr, Sivuch.

Destroyers—Probably sixteen, with thirty torpedo-boats.

Of these ships, the Tsarevitch (13,100 tons), and the Retvisan (12,700 tons), are the first two to be completed of the 1898 Russian building programme, of which at various times so much has been heard. The Retvisan has been on the station some twelve months, the Tsarevitch has only recently arrived, having left Toulon on September 7 last. Both ships were built at foreign yards, the Retvisan by Cramp, of Philadelphia, and the Tsarevitch at the La Seyne Works, near Toulon, and are extremely formidable vessels. The armor protection in both ships for both hull and guns is good, especially so in the Tsarevitch, in which ship particular pains were taken to prevent the chances of serious damage from torpedo attack by bending the lower armored deck, and carrying it down each side to the double bottom at the turn of the bilge, the thickness being increased on the curve and sides to 4 inches; this steel wall extends from the stem to just abaft the after magazine, and is one of the most notable features in her and her five sisters, still under construction or completing in the Baltic yards.

The armament of the two ships is the same, viz., four 12-inch guns in pairs in barbettes, one forward and one aft; twelve 6-inch Q. F. guns, in pairs in small turrets in the Tsarevitch, and in a casemated battery in the Retvisan, twenty 12-pounder Q. F. guns, and some smaller Q. F. and machine guns, with four torpedo discharges, two of which are submerged. Both ships have a speed of from 18 to 18.5 knots.

The Poltava, Sevastopol, and Petropavlovsk are three sister-ships of 10,950 tons displacement; laid down in 1892 at St. Petersburg, and launched two years and a half later. In armor protection they fall short as compared with the Japanese ships, their water-line belt of 15-inch Harveyized steel only extending for some 280 feet amidships, while the small redoubt above has only 4-inch armor. The turrets for the heavy guns are 10-inch, with 5-inch bases, and the casemates and small turrets for the secondary battery are also of 5-inch steel. Their armament, however, is a formidable one, comprising four 12-inch guns in two turrets, twelve 6-inch Q. F. guns, eight of which are carried in pairs in small turrets, and the other four in the casemate amidships, with twenty small Q. F. and machine guns. They have a nominal speed of 17 knots.

The Peresviet and Pobieda are vessels of 12,600 tons. Although sometimes classed as battleships, they are really rather formidable armored cruisers. The Pobieda has a complete water-line belt of 9-inch Harveyized steel, tapering to 4 inches at the ends. In the Peresviet and Ossliabya, the third ship of the class, the belt runs only for some two-thirds of the length of the ship; there is a central casemated battery protected by 5-inch

armor, while the turrets for the heavy guns are of 10-inch. The armament for their displacement is somewhat weak, as they only carry four 10-inch guns, ten 6-inch Q. F. guns, with twenty 12-pounder Q. F., and some twenty-six small Q. F. and machine guns. These ships have a speed of from 18 to 19 knots. One of their great defects unquestionably is that they are huge targets, with a very large area of unprotected side; the bases of the turrets for the 10-inch guns are also badly protected, and liable to be seriously damaged by the explosion of heavy shells beneath the projecting portions.

Coming to the armored cruisers, only two—the Gromoboi and Bayan—are first-class vessels. The Gromoboi is a new ship of some 12,000 tons displacement, laid down in 1899, and has been in commission about a year. She is protected at the water-line for about two-thirds of her length by a 6-inch belt of hard nickel steel, above which, reaching to the upper deck, is a central battery some 100 feet in length, protected by 4-inch steel. The casemates for the guns in the battery are 6 inches in thickness. Her armament consists of four 8-inch Q. F. guns, one at each corner of the central battery, sixteen 6-inch Q. F. guns, twenty 12-pounder Q. F., and twenty-four small Q. F. and machine guns. She has a speed of 20 knots, with a coal capacity of 2000 tons.

The Bayan, also a new ship, of 7800 tons displacement was built by the La Seyne yard, near Toulon, and has only recently arrived on the station, having gone out in company with the Tsarevitch. A full description of this ship appeared in the December number of the *Journal*, 1902.

The Rossia and Rurik are simply belted cruisers and although they have a powerful armament, viz., four 8-inch and sixteen 6-inch Q. F. guns, with six 4.7-inch Q. F. guns in the Rurik, and twelve 12-pounder Q. F. guns in the Rossia, besides smaller guns; the guns are, however, without any protection, except the two forward 8-inch guns in the Rossia, which are in casemates protected by 2-inch hard steel.

The first-class protected cruisers are all new ships, and fine vessels of their class, three of them, the Variag, Askold, and Bogatyr, have a speed of 23 knots, and their 6-inch guns have a certain amount of protection with 3-inch armored ammunition hoists.

There are no accurate details as to the number of destroyers and torpedo-boats Russia has in the Far East, as a good many have been sent out in sections and put together at Port Arthur and Vladivostok; but it is believed there are sixteen destroyers and some thirty torpedo-boats, which are distributed between the two ports. Seven more destroyers, with six first-class torpedo-boats, are also on their way out, escorted by the Ossliabya and the cruisers Aurora and Dmitri Donskoi. By the last accounts these ships appear to be still in the Red Sea, waiting orders, at anchor off Jebel Zukur, not far from Perim.

Diplomatic relations were broken off by Japan on the 6th inst., and hostilities commenced on the night of the 8th-9th by an attack by the Japanese torpedo flotilla, covered by a small squadron, on the Russian fleet, which was lying at anchor in the outer roads of Port Arthur, when the Japanese destroyers succeeded in torpedoing the battleships Tsarevitch and Retvisan, with the cruiser Pallada, the Tsarevitch having been struck aft, the Retvisan forward, and the Pallada amidships; it appears to have been found necessary to beach all three ships at first, but apparently, although reports are somewhat conflicting, they have all three since been brought into the inner harbor. It is doubtful if either of the battleships in their damaged condition can be got into the one available dock at Port Arthur, or if the yard is sufficiently well equipped to properly repair the serious damage which the ships have probably sustained. The next forenoon (the 9th inst.) the main Japanese fleet made an attack and appear to have damaged by their gun fire, more or less seriously, the Poltava, with the Askold, Diana, and Novik; the Askold so seriously that according to the latest reports she has sunk. On the afternoon of the same day the

Variag and Koreëtz were attacked and sunk off Chemulpho. On the 11th inst., a further disaster befell the Russians in Port Arthur by the accidental blowing up of the torpedo-depôt mining-ship Yenisei, while attempting to secure a mine which had broken loose from the mine-field. Her captain and ninety-six men went down with the ship.

Whether the Russian fleet could have met the Japanese on fairly equal terms had the Port Arthur squadron put to sea, instead of remaining at anchor in the exposed outer roadstead, it is now impossible to say. But the chances would all have been in favor of the homogeneous and powerful Japanese battle squadron. There have been rumors for several months past that the Sevastopol and her two sister-ships were in an unsatisfactory state; it has been freely stated that the Sevastopol's turrets had sunk so perceptibly that there was a difficulty in working them, and it is certain that all three ships were to have been brought home as soon as they could have been relieved. It is further stated that although fresh from the builder's hands, the Tsarevitch had already developed many defects; among others, her ammunition hoists would not work properly, and workmen from the La Seyne yard had followed the ship out to put things right.

Neither the Rurik nor the Rossia are in good condition; they have both been out on the station for some time, and are badly in want of repairs; like many Russian ships built in their own yards, it has been an open secret from the time of their arrival on the station that the work on board them had been scamped, the Rossia's bottom, in particular, when in dock, having shown decided signs of weakness. These two ships, with the Gromoboi and Bogatyr, were, by the last accounts, at Vladivostok, and interest is naturally centred on their future movements.—*United Service Institution.*

SPAIN.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Protected Cruisers.			
Reina Regente	5,372	Ferrol.	Building.
Isabel la Catolica	3,500	Canaca.	"

SWEDEN.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Coast Defense Battleships.			
Aran	3,650	Gothenburg.	Under trial.
Wasa	3,650	Malmö.	Launched.
Manligheten	3,650	"	"
Tapperheten	3,650	Stockholm.	Launched.
Dristigheten	3,650	Gothenburg.	Under trial.
Armored Cruiser.			
Fylgia	4,600	Stockholm.	Building.

TURKEY.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Protected Cruisers.			
Abdul Medjed	3,830	Cramp's Shipyard.	Launched July 25, 1903.
Abdul Hamid	3,830	Elswick.	" Sept. 25, 1903.

UNITED STATES.

VESSELS BUILDING.

No.	Name.	Speed. Knots.	Where Building.	Degree of Completion. Feb. 1.	Mar. 1.
	Battleships.				
12	Ohio	18	Union Iron Works.	86.5 per ct.	88 per ct.
13	Virginia	19	Newport News Co.	53.8	65
14	Nebraska	19	Moran Bros. Co.	37.7	41.6
15	Georgia	19	Bath Iron Works.	45.4	47.6
16	New Jersey	19	Fore River S. & E. Co.	50.3	52.1
17	Rhode Island	19	Fore River S. & E. Co.	51.7	54
18	Connecticut	18	Navy Yard, New York.	28.5	30.9
19	Louisiana	18	Newport News Co.	37.6	40.6
20	Vermont	18	Fore River, S. & E. Co.	3.6	4.6
21	Kansas	18	New York S. B. Co.	3.9	5.2
22	Minnesota	18	Newport News Co.	14.7	18.3
23	Mississippi	17	Cramp & Sons.	....	....
24	Idaho	17	Cramp & Sons.	....	....
	Armored Cruisers.				
6	Pennsylvania	22	Cramp & Sons.	66.8	68.6
5	West Virginia	22	Newport News Co.	73.3	76.7
4	California	22	Union Iron Works.	54	56.5
7	Colorado	22	Cramp & Sons.	71.8	73
8	Maryland	22	Newport News Co.	69.2	71.2
9	South Dakota	22	Union Iron Works.	50	52.5
10	Tennessee	22	Cramp & Sons.	16.6	19.5
11	Washington	22	New York S. B. Co.	13.9	17
	Protected Cruisers.				
14	Denver	17	Neafie & Levy.	98	98
15	Des Moines	17	Fore River S. & E. Co.	99	99.5
16	Chattanooga	17	Lewis Nixon.	72	72.6
17	Galveston	17	Wm. R. Trigg Co.	72	73.5
18	Tacoma	17	Union Iron Works.	97	98
20	St. Louis	22	Neafie & Levy.	37.9	38
21	Milwaukee	22	Union Iron Works.	42.5	44.5
22	Charleston	22	Newport News Co.	60	64.5
	Gunboats.				
17	Dubuque	12	Gas Engine & Power Co.	25	29.1
18	Paducah	12	Gas Engine & Power Co.	22.2	26.5

THE NEW TRAINING BRIG BOXER.—In accordance with the act of Congress approved March 3, 1903, authorizing the construction of one wooden brig, to be used for training landsmen and apprentices at stations, to be propelled by sail, and to cost not more than $50,000, the Bureau of Construction and Repairs has provided the necessary plans and specifications, and the Navy Department has ordered that the vessel be built at the navy-yard, Portsmouth, N. H. The general dimensions and chief characteristics are: Length on the load water-line, 108 feet; breadth, extreme to outside planking, 29 feet 11 inches; displacement, 345 tons; mean draft to bottom of false keel, 9 feet 6 inches; depth, top of ceiling to under side of main deck, 10 feet. The hull is to be constructed in general of yellow pine planking and white oak timbers and will be copper sheathed below the water-line. There will be berth, main, forecastle, and poop decks. The anchors will be handled by a hand windlass on the main deck, and all the necessary chocks, pipes, leads, etc., will be properly installed and secured. The anchors will be stowed on billboards and will be handled for stowage by the capstan davit and catheads. The following boats will be carried: One 24-foot cutter, one 20-foot whaleboat, one 18-foot dinghy, and two balsas. Davits and cradles and all necessary fittings for stowing these boats will be provided. Accommodations will be provided for a command-

ing officer, two other commissioned officers, and a crew of about 60 landsmen and apprentices. There will be a deckhouse on the main deck forward, in which will be located the galleys for crew and officers. A hand-steering gear will be fitted on the poop deck. The masts will be of Oregon pine. Three water tanks of 700 gallons capacity each will be installed and a space will be provided for the stowage of fuel.—*Nautical Gazette.*

Only the other day the last British sailing training ship was put out of commission. The French have now followed suit, and under date of January 6, the Brest correspondent of "Le Yacht," announces that the order has been received to pay off the Melpomone, the last French war vessel dependent upon sail power alone.

ORDNANCE AND GUNNERY.

PRIZE FIRING IN THE CHANNEL FLEET.—In our last issue we gave results of the recent prize firing with the light quick-firing guns of the Channel fleet. Particulars have now come to hand of the prize firing with the heavy guns of the fleet, which was carried out at Gibraltar under not very favorable weather circumstances. The shooting, however, was exceptionally good, and a marked improvement on the results of previous years on all the ships. Some of the best shots with the 12-inch guns were: Carter, P. O. 1, of the Jupiter, five rounds, five hits; Painter, P. O. 1, of the Hannibal, four rounds four hits; Gamble, P. O. 1, of the Majestic, four rounds, four hits; and with the 6-inch gun, Petty Officer (1) Primrose, of the Majestic, nine rounds, nine hits.

Ship.	Gun.	Rounds.	Hits.	Name of Gunner.
Majestic	12-inch	10	7	Vaughan, C. P. O.
		4	4	Gamble, P. O. 1.
Jupiter	12-inch	5	5	Carter, P. O. 1.
Magnificent	12-inch	9	5	Marks, P. O. 1.
		4	4	Kingsley, P. O.
Mars	12-inch	14	8	Sweetman, P. O.
				Wheller, P. O.
Hannibal	12-inch	14	11	
		4	4	Painter, C. P. O.
Hogue	9.2-inch	8	7	Prouse, P. O. 1.
		18	11	Bridgeman, P. O. 1.
				Paul, P. O. 1.
Majestic	6-inch	15	13	Primmer, P. O. 1.
				Short, L. S.
Jupiter	6-inch	12	9	Sgt. Tunnicliffe.
				Gr. Heald, R. M. A.
Magnificent	6-inch	12	10	Sgt. Moss, R. M. A.
				Bomb. Vince.
Mars	6-inch	12	10	Mills, P. O. 1.
				Morgan, P. O.
Hannibal	6-inch	14	12	Sgt. Whatling, R. M. A.
				Gr. Halliday, R. M. A.
Hogue	6-inch	13	9	Wonnacott, L. S.
				Flynn, A. B.
Doris	6-inch	13	10	Mitchell, P. O.
				Hickman, P. O.
Pactolus	4.7-inch	11	7	Purnell, A. B.
				Atker, A.B.
Prometheus	4.7-inch	12	7	Tag, P. O. 1.
				Keely, L. S.

—*United Service Gazette.*

PRIZE FIRING ON THE CHINA STATION.—The following is a return of the heavy-gun practice made by the ships on the China station during 1903, the vessels being given in their order of merit:

1. Bramble.—Two 4-inch Q. F.; rounds fired, 32; hits, 20; hits per gun per minute, 5; points per hit, 8.68; total points, 173.6; points per gun, 86.96.

2. Albion.—Four 12-inch B. L.; rounds fired, 26; hits, 18; hits per gun per minute, .75; points per hit, 17.09; total points, 307.62. Twelve 6-inch Q. F.; rounds fired, 149; hits, 95; hits per gun per minute, 3.95; points per hit, 10.53; total points, 1000.35; points per gun, 81.74.

3. Goliath.—Four 12-inch B. L.; rounds fired, 24; hits, 15; hits per gun per minute, .624; points per hit, 17.09; total points, 256.41. Twelve 6-inch Q. F.; rounds fired, 160; hits, 97; hits per gun per minute, 4.04; points per hit, 19.53; total points, 1022.23; points per gun, 79.92.

4. Talbot.—Five 6-inch Q. F.; rounds fired, 61; hits, 33; hits per gun per minute, 3.3; points per hit, 10.53; total points, 563.97. Six 4.7-inch Q. F.; rounds fired, 96; hits, 55; hits per gun per minute, 4.58; points per hit, 9.22; total points, 506.10; points per gun, 77.7.

5. Glory.—Four 12-inch B. L.; rounds fired, 21; hits, 14; hits per gun per minute, .58; points per hit, 17.09; total points, 239.26. Twelve 6-inch Q. F.; rounds fired, 147; hits, 91; hits per gun per minute, 3.79; points per hit, 10.53; total points, 957.84; points per gun, 74.81.

6. Blenheim.—Two 9.2-inch Mark VI; rounds fired, 26; hits, 13; hits per gun per minute, 1.05; points per hit, 11.28; total points, 146.64. Ten 6-inch Q. F.; rounds fired, 120; hits, 68; hits per gun per minute, 3.4; points per hit, 10.53; total points, 716.04; points per gun, 71.89.

7. Espiegele.—Six 4-inch Q. F.; rounds fired, 76; hits, 49; hits per gun per minute, 4.1; points per hit, 8.68; total points, 425.3; points per gun, 70.9.

8. Argonaut.—Sixteen 6-inch Q. F.; rounds fired, 176; hits, 104; hits per gun per minute, 3.25; points per hit, 10.53; total points, 1005.12; points per gun, 68.7.

9. Ocean.—Four 12-inch B. L.; rounds fired, 28; hits, 18; hits per gun per minute, .75; points per hit, 17.09. Twelve 6-inch Q. F.; rounds fired, 107; hits, 73; hits per gun per minute, 3.04; points per hit, 10.53; total points, 1076.3; points per gun, 67.2.

10. Cressy.—Twelve 6-inch B. L.; rounds fired, 129; hits, 68; hits per gun per minute, 2.83; points per hit, 10.11; total points, 687.48. Two 9.2-inch; rounds fired, 28; hits, 12; points per hit, 8.33; total points, 99.95; points per gun, 57.6.

11. Pique.—Two 6-inch Q. F.; rounds fired, 16; hits, 6; hits per gun per minute, 1.5; points per hit, 10.53; total points, 63.18. Six 4.7-inch Q. F.; rounds fired, 81; hits, 41; hits per gun per minute, 3.42; points per hit, 9.22; total points, 378.02; points per gun, 55.18.

12. Amphitrite.—Sixteen 6-inch Q. F.; rounds fired, 158; hits, 83; hits per gun per minute, 2.59; points per hit, 10.53; total points, 873.99; points per gun, 54.52.

13. Eclipse.—Five 6-inch Q. F.; rounds fired, 52; hits, 19; hits per gun per minute, 1.9; points per hit, 10.53; total points, 200.07. Six 4.7-inch Q. F.; rounds fired, 86; hits, 39; hits per gun per minute, 3.25; points per hit, 9.22; total points, 359.58; points per gun, 50.87.

14. Vengeance.—Four 12-inch B. L.; rounds fired, 19; hits, 8; hits per gun per minute, .38; points per hit, 17.09. Twelve 6-inch Q. F.; rounds fired, 114; hits, 62; hits per gun per minute, 2.68; points per hit, 10.53; total points, 792.68; points per gun, 49.54.

15. Thetis.—Two 6-inch Q. F.; rounds fired, 20; hits, 7; hits per gun per minute, .175; points per hit, 10.53. Six 4.7-inch Q. F.; rounds fired, 70; hits, 33; hits per gun per minute, 2.75; points per hit, 9.22; total points, 377.97; points per gun, 47.24.

16. Vestal.—Six 4-inch Q. F.; rounds fired, 67; hits, 30; hits per gun per minute, 2.5; points per hit, 8.68; total points, 260.4; points per gun, 43.48.

17. Algerine.—Six 4-inch Q. F.; rounds fired, 65; hits, 27; hits per gun

per minute, 2.25; points per hit, 8.68; total points, 234.36; points per gun, 39.13.

18. Fearless.—Four 4.7-inch Q. F.; rounds fired, 44; hits, 17; hits per gun per minute, 2.125; points per hit, 9.22; total points, 156.74; points per gun, 39.2.

19. Rinaldo.—Six 4-inch Q. F.; hits, 26; hits per gun per minute, 2.16; points per hit, 8.68; total points 225.68; points per gun, 37.61.

20. Mutine.—Six 4-inch Q. F.; rounds fired, 75; hits, 21; hits per gun per minute, 1.75; points per hit, 8.68; total points, 182.28; points per gun, 30.43.

21. Britomart.—Two 4-inch Q. F.; rounds fired, 32; hits, 7; hits per gun per minute, 1.75; points per hit, 8.68; total points, 60.76; points per gun, 30.43.

22. Rosario.—Six 4-inch Q. F.; rounds fired, 66; hits, 21; hits per gun per minute, 1.75; points per hit, 8.68; total points, 182.28; points per gun, 30.38.

23. Sirius.—Two 6-inch Q. F.; rounds fired, 13; hits, 1; hits per gun per minute, .125; points per hit, 10.53. Six 4.7-inch; rounds fired, 78; hits, 21; hits per gun per minute, 1.75; points per hit, 9.22; total points, 204.15; points per gun, 25.51.

24. Phœnix.—Six 4-inch Q. F.; rounds fired, 55; hits, 15; hits per gun per minute, 1.25; points per hit, 8.68; total points, 130.2; points per gun, 21.74.—*United Service Gazette.*

A new design of gun of various calibres has been approved for the French navy, and orders have been issued for the manufacture of weapons of the new design for the ships now being constructed. The notable feature is the higher velocity to be developed—over 3035 feet per second, while it is not so many years since 2000 feet per second was considered the greatest realizable. The new guns will have a length of 50 calibres, making the 6-inch weapon 25 feet long, and the 12-inch guns 50 feet. Changes are to be made in the structure of the gun to increase the support of the muzzle end, the principal improvement being in the form of tubes joggled together and extending to the breech end. The chamber is to be increased in size, and thus the charge may be greater. By reason of the longer barrel, the explosive will have more time in which to exert its expansive propelling force. The 6-inch gun will be increased in weight from 8.1 to 9.5 tons, as compared with the British service weapon of 7.4 tons; while the 12-inch gun will be 60.8 tons, as compared with 44.4 tons of the existing weapon, and with the 46-tons gun in the British service. There will, however, be a very considerable increase in muzzle energy, equal to 27 per cent in the case of the 6-inch gun and 30 per cent in the 12-inch weapon. In other words, a gun of 10.78-inch calibre will equal a 12-inch, while a 9.45-inch weapon will prove as effective against armor of the latest quality as the old 10.78-inch. A considerable reduction in weight must follow, or a greater number of guns be installed for the same weight. This is a matter of the highest importance. The result is due in part to the adoption of an explosive composed of greater power and yet of less erosive effect than that adopted in our navy.—*United Service Gazette.*

The prize-firing returns of the British fleet for 1903 have just been compiled. The performances of 134 ships are shown. The average percentage of hits was just over forty-six. The best ship secured an average of 70 per cent in hits. Only seventy-three men have earned the newly instituted medal and gratuity for good marksmanship. The largest number of medals go to captains of 6-inch guns, twenty of whom receive the decoration. The remainder of the medals are distributed as follows: Thirteen to captains of 12-inch guns, ten for marksmanship with the 4.7, fourteen for the 12.6, and 3-pounders, three for the 13.5, one for the 10-inch, five for the 9.2, four for the 4-inch, and three go to men serving on destroyers.—*United Service Gazette.*

The interest which is being taken in the subject of the sighting of our guns renders of special importance the announcement that the Hero has returned to Portsmouth from Portland, where she has been carrying out some further experiments with a new pattern of turret sight. The firing was carried out under prize-firing conditions, and some marvellous results are reported to have been obtained. The Hero is to be relieved by the Colossus, and further experiments are to be made in the same direction. At last it is evident that some advance is being made in this matter, and we may hope that this question of the sights will receive satisfactory settlement. *Apropos* of the same subject, we note that on Wednesday in last week, Captain Percy Scott, in returning thanks for the navy at the Mercers' Company's banquet, spoke of the importance of hitting. He pointed out that Lord Charles Beresford had said in his address to the Chamber of Commerce that improvement was needed in gunnery, and that no sooner did Lord Charles take command than he saw that there was an improvement in that direction, and with the result that the Majestic, flying Lord Charles' flag, had made in 1903 a score unprecedented in any navy in the world. For the energy and zeal he had brought to bear upon this improvement, the gunnery lieutenant of the ship had very properly been promoted. Captain Scott also urged the importance of even one of these 800-pound projectiles which were fired from the big guns of the Majestic striking an enemy, and described what might be expected therefrom. He reminded his hearers that the gunners in Lord Charles' flagship had put 60 per cent of these projectiles on to a target which represented only a speck of the whole area of the enemy.—*Army and Navy Gazette.*

We understand that experiments have already been carried out in battleships with refrigerating machinery for the purpose of maintaining an even temperature in the magazines. It appears that further tests are about to be conducted on board the Ramillies. Steam will be raised some days prior to the commencement of the tests, in order that the magazines and other compartments may be warmed. The object in view is to maintain a temperature of 100 degrees Fahrenheit in the magazines. If this can be done a considerable improvement in the shooting may be expected, as it will be remembered that naval gunnery has more than once been affected by the changes of temperature to which the charges were subjected.—*Engineer.*

The Venerable, with the Duncan and Intrepid, has, says a correspondent with the Mediterranean fleet, taken up her headquarters in Dragomesti Bay, and carries out firing daily at a target on Prasa Island. The chief problem she wishes to solve now is that of "fire control," and it may be expected that in future the guns of a ship will be directed from the foretop—possibly by way of the conning tower—by the gunnery officer of each vessel. The alternative is to allow each officer of a quarter to act independently, of course, within limits. Anyhow, the old idea of originally conducting affairs from the conning tower is doomed, except as a "standby."—*United States Gazette.*

CONCERNING THE NEW FIELD GUN.

By "SUA TELA TONANTI."

Shrapnel Fire *v.* Rapid Fire. This expression may appear to some to imply a bold assertion, but that the two terms cannot be regarded as synonymous at present will not be denied.

Among the translations circulated with the Royal Artillery Institution Proceedings for September last is one by Major Bethell, R. F. A., of a pamphlet by Lieut.-Gen. von Reichenau, German Army, on the Results of a Series of Experiments of Small-Bore Field Guns (Q. F. 2-inch), with

high explosive shells, 4½ lb. The translator, in an introductory preface of his own, remarks that Gen. von Reichenau is "not without honour in his own country, but his views are considered extreme by many officers, and must not be taken as representing the general opinion of German artillerists." The gun referred to was tried during 1903 by the Swiss Government; but the results obtained fell far short of the performances recorded in the general's pamphlet. Yet as the experiments reported on by the latter were carried out over "average ground" and not in specially favorable conditions, some attention should be paid to his statistics, and the system advocated so strongly by him certainly merits some attention on the part of our Ordnance Committee and the powers who control the choice of the new field gun.

From what we can gather at present of experiments carried out at our practice camps at home during 1903, the field gun about to be adopted is an 18-pound Q. F. firing shrapnel, having a long range, and it is to be a comparatively high-velocity gun. If increase in weight and individual bullet-effect in the projectile, combined with Q. F. breech action and high velocity alone require consideration, a distinct advance may certainly be claimed. But when we hear of such small reduction of weight behind teams, practically no advance in the rate fixing time-fuses to keep pace with the increased rate of loading, laying, and firing (it must be remembered that even with the 15 pound and 12-pound B. L. these attainments were far ahead of what was necessary to keep pace with efficient fuse-setting, even with the most recent fuse employed during the late war), it cannot be said that any very great advance in artillery fire effect can be looked forward to in the near future. We hear nothing of any unsuccessful trials of high explosive small calibre guns and shell, but we are confronted with the outcry from France of shrapnel against shielded guns being practically harmless.

South African war experiences have shown us that the shrapnel with its clumsy adjuncts for man-killing efficiency, gave the Boers time to get out of harm's way on those rare occasions when a good target did present itself in the open. It would seem the time has now come for radical change, and, seeing that all European powers boasting an up-to-date artillery equipment are employing and experimenting with shielded guns, we might pay some attention to General von Reichenau's conclusion: "Shields and high explosive shells must be introduced at once." Complete as the general's report is, he omits to make any remark on at least three points, which seem to weigh heavily in favor of his scheme, viz.:

1 The enormous gain in mobility that can be brought about by the adoption of a small calibre gun.

2 The small amount or almost absence of blast produced by such small calibre gun in not showing the gun up when it is otherwise well concealed.

3 The late period up to which a gun firing percussion projectiles can cover and support an infantry attack, with comparative safety to the latter, as against the danger incurred by the employment of shrapnel.

Of these (1), opens up a lengthy subject which it is not proposed to discuss here, but (2) and (3) are points which can be supported by many instances which occurred during the late war, affording profitable lessons. Owing to its comparatively small man-killing power, recognized as far back as 1889, the pom-pom was rejected as any sort of weapon for the British Army; but the urgent appeal for it as an artillery weapon soon after the commencement of the war, its moral effect against all troops, largely on account of its invisibility and difficulty of locating it in action, at least entitle improvements and developments on its principles to some consideration. On soft, dusty, and sandy ground, best suited to earthworks, its man-killing effect is practically *nil*, but it has been able to kick up the dust in front of and obscure the view of many a man in a slouch hat until the attacking infantry has got up so close as to turn out the former and help the latter in gaining many a position with comparatively little loss as compared with

what would probably have happened without its support. In the last 150 yards of the attack time shrapnel must cry off, and the higher the velocity of the projectile the greater is the accuracy required in the fuse to bring about an equally good result; whereas, with shell bursting on grass, fire can be kept up at medium ranges with little risk of danger to friends until the attack is within 50 yards of an enemy's position from directly in rear, while with oblique and enfilade fire even later, and at long ranges as the angle or descent increases this space need not be reduced; whereas a large bore gun firing heavy projectiles must necessarily be brought as near to the ground as possible for purpose of stability when travelling, and thus to a large extent neutralize through dust thrown up by blast, the invisibility gained for it by the use of smokeless powder. A light small calibre gun can be granted higher "command" without this disadvantage.

Apart from these salient considerations, others of importance weigh in favor of rapid or high explosive percussion system, and these are duties imposed on ammunition columns and supply of ammunition in the field. With shrapnel weighing 18 lb., shell, cartridge, tubes, and fuses have all to be carried separately. It may be taken as a general rule in the case of projectiles up to 12 lb., that a complete round will weigh double that of the projectile, which for a 12-pounder, would weigh 24 lb., and above that very little less than this proportion. With 18-pounder a complete round would weigh at least 30 lb. when all packing is considered. Now each change of target requires at least two bracketing rounds. which means at least 60 pounds non-effective ammunition for every change of target. Against this the high explosive 4¼-lb. projectile, probably fixed ammunition, each round complete in itself (the maximum of simplicity in supply), would give a corresponding non-effective weight for every change of target of 17 lb., and the greater the non-effective rounds, the more would figures favor the high explosive percussion system as against shrapnel fire.

Ideals are, of course, difficult to come within measurable distance of, and there are always critics to be found who will regard advances as distinct retrograde movements where two distinct roads lie open to selection. It would, however, seem in this instance that before embarking on a new armament for the Horse and Field Artillery of our reformed army it would be well to make quite certain that under the altered condition of the most recent armaments abroad we have really chosen the right road to start on. A few thousand spent on exhaustive trials during the coming drill season with the armament suggested by General von Reichenau may be the saving of millions of money later on, and also of valuable lives at a time when their services are much needed by the country.—*Army and Navy Gazette.*

TURBINE MACHINERY.

TRIALS OF A TURBINE DESTROYER.—The torpedo-boat destroyer, Eden, built by Messrs. R. & W. Hawthorn, Leslie & Co., Limited, Newcastle-on-Tyne, to the order of the Parsons Marine Steam Turbine Company, Limited, for the Admiralty, has now completed her official trials. The Eden is one of the latest 25½-knot type of destroyer, and is fitted with Parsons' turbines instead of reciprocating engines. Her dimensions are: Length, 220 feet; breadth, 22 feet 6 inches; and depth, 13 feet 9 inches.

On the official four hours' full-speed trial, with over 125 tons load on board, the vessel easily attained the speed of 26.099 knots for the first hour, and 26.229 for the last three hours, the guaranteed speed being 25½ knots. The result of a previous four hours' full-speed coal-consumption trial was very satisfactory, the coal consumption being within the amount stipulated in the contract.

The main propelling machinery which was constructed at the Turbinia Works, Wallsend-on-Tyne, consists of three turbines, one high pressure

and two low pressure turbines, each driving separate shafts with two propellers on each shaft. Inside the exhaust casing of each of the low-pressure turbines a reversing turbine is fitted. In view of the great variation in the horse-power required in modern war vessels, two additional cruising turbines are permanently coupled to the shaft of the main low-pressure turbines. When working at reduced power the steam from the boilers passes through the cruising turbines in series, and thence to the main turbines. By this means a high ratio of expansion of the steam at all lower speeds is obtained, and the loss by throttling of the steam is avoided.

In view of the general interest which is felt in the increasing employment of the turbine method of propulsion it will be not out of place to record the names of the steamers fitted with turbines which have been launched in Great Britain during 1903. They are as follows: H. M.'s third-class cruiser Amethyst, 3000 tons displacement; H. M.'s destroyer Eden, 565 tons displacement; the yacht Lorena, 1303 tons gross; and the Channel steamers the Queen and Brighton, of 1676 and 1129 tons gross, respectively. —*United Service Gazette.*

TURBINE PROPELLED STEAMSHIP FOR CUNARD LINE.—After several months' investigation the Cunard Steamship Co., has given out a contract for the construction of a turbine steamer for the North Atlantic service. The new vessel will not, however, be one of the two twenty-five knot leviathans stipulated for in the Cunard's agreement with the British Government, but a duplicate of the 12,000 ton steamer Curonia, recently contracted for by the firm of Clydebank builders, John Brown & Co. The new vessel will be fitted with turbine engines instead of, as in the case of the Curonia, reciprocating engines. The Cunard directorate has been holding sittings in Liverpool under the Presidency of Lord Inverclyde and the principal business considered was the question whether or not one or both of the two new express liners to be built for the company should be fitted with turbine engines. The decision now taken is regarded as a victory for the turbine. Only the most sanguine supporters of the turbine expected that the conservative Cunard Company would run the tremendous risk involved by fitting a mammoth liner with the Parsons engines on the data at present available, and the new departure, it is claimed, will afford a sufficient practical test of the new method of propulsion for the trans-Atlantic traffic.—*Nautical Gazette.*

Considerable interest attaches to the results of the trials of the German protective-deck cruiser Hamburg, as she is one of the two vessels building by the Vulcan Company, of Stettin, for the purpose of testing the relative efficiency of reciprocating and turbine engines. The Hamburg has the ordinary piston and crank engines; the sister cruiser, to be fitted with the Parsons rotary engine, is far advanced. Both hulls are exactly alike; the length is 360 feet 10 inches, the beam 40 feet 4 inches, and at 16 feet 5 inches draught the displacement is 3000 tons. Normand boilers are used, and with twin-screw reciprocating engines a speed of 23.3 knots has been realized with 11,000 indicated horse-power. This power is 1000 in excess of that anticipated in design, and the result was the addition of 1.3 miles per hour to the speed expected. The turbine boat has therefore a stiff task yet. It will have exactly the same underwater form, and the same boilers, and on trial will have the benefit in reduced displacement of any economy in weight resulting from the application of the turbine system of propulsion. Each ship is to be driven to give its best result, and the weight of water and coal used to attain a given speed over a lengthy run will be the measure of the work done by each system of prime mover. Curiously enough, these German ships are of the same size as the Amethyst and Topaz, the British cruisers, with which similar comparative trials are to be made, the former having the turbine and the latter reciprocating machinery. The length and beam differs only by inches, but the British ship is of lighter draught, and the anticipated speed with 9800 I. H. P. is 2¾ knots. Our

ships have twelve 4-inch guns, the German ships only ten; but the latter have more smaller guns.—*United Service Gazette.*

STEAM TRIALS.

WARSHIP STEAM TRIALS IN 1903.—During the year which has just closed twenty-nine new ships for the British navy passed through their steam trials. The number includes four battleships, eight armored cruisers, one protected cruiser, and a sloop; while three gunboats, which had been re-engined, have also been tried. In addition there were ten torpedo-boat destroyers and five first-class torpedo-boats. This number of vessels exceeds the average, and, in view of the high designed speed, the results are of special interest. In the previous year there were sixteen ships, with two torpedo-boat destroyers; in 1901, fourteen large ships and eighteen torpedo craft; and in 1900, ten new ships and fifteen torpedo craft. The results of the trials of the larger ships are set out in Table I, and of the torpedo craft in Table II.

One feature of the results tabulated is due to the inclusion of a larger variety of types of water-tube boilers. For instance, we have two battleships, one with Babcock and Wilcox boilers and the other with Belleville boilers. These are the Queen and Prince of Wales. It both cases the machinery is alike, and the hull has in each instance, been made from the same drawings; a comparison between the performance of these two ships may thus be justifiable. It is notable, in the first place, that in the Babcock and Wilcox boiler a larger allowance of heating surface is made for for the same power, the ratio in the one case being 2.56 square feet of heating surface per unit of power, while in the case of the Belleville boiler ship the proportion is 2.47 square feet per unit. At the same time the grate area is larger in the case of the Belleville boiler, there being 1 square foot of grate to 31.37 square feet of heating surface, as compared with 1 square foot to 33.5 square feet in the case of the Babcock and Wilcox steam generator. The coal consumption results are distinctly in favor of the Babcock and Wilcox boilers, so far as these two ships are concerned, the apparent difference being about 20 per cent; it would, however, be a mistake to dogmatize on these two isolated instances. A more comprehensive trial, under exactly corresponding circumstances—and possibly, also, for a longer period under service conditions—could alone yield results on which to base anything like a conclusive opinion. Moreover, the personal equation, as we have aforetime pointed out, must always be an important factor in the case. Of course, we do not presume to state that experience will not bear out the difference recorded above; the facts given will incline many to look forward with very considerable interest to the subsequent comparative trials of these and of other ships similarly conditioned.

The other two battleships in the list—the Cornwallis and the Albemarle—differ from those to which we have just referred in respect that they were designed to attain a speed of 19 knots, and for this reason greater weight was afforded to machinery and less to armor protection. The broadside belt was therefore reduced in the case of the 19-knot ships to 7 inches, as compared with 9 inches in the Queen and Prince of Wales; this enabled the weight of machinery to be 1580 tons, as compared with 1530 tons in the Queen and 1430 tons in the Prince of Wales. At the same time it was required that in the Cornwallis, and the other five vessels of the class, 11.4 indicated horse-power should be realized per ton of machinery, whereas in the Prince of Wales the power to be attained is at the rate of 10.49 indicated horse-power, and in the Queen 9.80 indicated horse-power per unit of power. All the six vessels of the 19-knot class have now been tried, and have given very good results. The class includes the Duncan, Russell, Montagu, Exmouth, Cornwallis and Albemarle. The noticeable feature in connection with their machinery is the fact

TABLE I.—RESULTS OF OFFICIAL STEAM TRIALS OF WARSIHPS MADE DURING 1903.

NAME OF VESSEL.	TYPE OF SHIP.	BUILDERS OF SHIP.	MAKERS OF MACHINERY.	Length in Feet.	Displacement.	Type of Boilers.	Heating Surface.	Grate Area.	FIRST 30 HOURS' COAL CONSUMPTION.			SECOND 30 HOURS' COAL CONSUMPTION.			FULL POWER.		
									Indicated Horse-Power.	Speed.	Coal per Indicated Horse-Power per Hour.	Indicated Horse-Power.	Speed.	Coal per Indicated Horse-Power per Hour.	Indicated Horse-Power.	Speed.	Coal per Indicated Horse-Power per Hour.
					tons		sq. ft.	sq. ft.		knots	lb.		knots	lb.		knots	lb.
Cornwallis	Battleship	Thames Company	Thames Company	405	14,000	Belleville	43,310	1380	9724	10.9 log.	1.96	13,687	17.94 M.M.	2.09	18,201	18.984 M.M.	1.89
Albemarle.....	Ditto	Chatham Dockyard	Ditto	405	14,000	Do	43,310	1380	9606	12.05 "	2.26	13,576	17.75 "	2.12	18,501	18.63 "	1.96
Queen	Ditto	Devenport Docky'd	Harland & Wolff	405	15,000	Babcock & Wilcox	36,400	1146	9058	11.6 "	1.84	11,670	16.97 "	1.61	15,556	18.039 "	1.76
Prince of Whales	Ditto	Chatham Dockyard	Greenock Foundry	400	15,000	Belleville	37,018	1180	3128	10.45 "	2.21	11,669	17.043 "	2.06	15,364	†	2.02
Monmouth'.....	First-class cruiser	London & Glasgow	London & Glasgow	440	9,800	Do	30,316	1610	4711	15.676 "	1.83	16,326	20.49 log.	1.45	22,189	22.36 log.	1.97
Essex.....	Ditto	Pembroke Docky'd	J. Brown & Co., Clydebank	440	9,800	Do	30,306	1618	4642	14.043 "	2.08	16,132	19.97 M.M.	2.17	22,219	22.79 M.M.	2.22
Berwick	Ditto	W. Beardmore & Co.	Humphrys, Tennant & Co.	440	9,800	Niclausse	32,340	1656	4671	14.59 "	1.75	16,622	21.644 "	1.78	22,681	23.613 "	1.91
Donegal.....	Ditto	Fairfield Company	Fairfield Company	440	9,800	Belleville	30,330	1610	4678	14.75 "	2.07	16,350	22.356 "	2.07	22,173	23.568 "	2.16
Lancaster.....	Ditto	Armstrong Co.	Hawthorn, Leslie & Co.	440	9,800	Do	30,388	1610	4643	13.43 "	2.1	16,044	22.03 "	2.16	22,861	24.01 "	1.94
Cumberland	Ditto	London & Glasgow	London & Glasgow	440	9,800	Do	30,326	1618	4980	15.4 "	2.09	16,472	22.136 "	1.96	22,764	23.68 "	2.01
Suffolk	Ditto	Portsmouth Docky'd	Humphrys, Tennant & Co.	440	9,800	Niclausse	32,340	1656	4954	14.4 "	1.89	16,350	21.2 log.	1.89	22,645	†	2.2
Euryalus.....	Ditto	Vickers Company	Vickers Company	440	12,000	Belleville	51,566	1645.2	4780	14.457 "	1.99	16,510	20.45 M.M.	2.22	21,309	21.635 "	1.96
Challenger.....	Sec'd-class cruiser	Chatham Dockyard	Wallsend Company	356	5,880	Babcock & Wilcox	30,755	828	2636	13.5 M.M.	1.745	8,972	19.24 M.M.	1.74	12,761	21.09 "	1.76
Clio.....	Sloop	Sheerness Dockyard	Humphrys, Tennant & Co.	185	1,070	Niclausse	4,000	185	311	8.7 log.	2.32	1,041	13.0 log.	1.94	1,436	13.88 "	2.03
Leda*	Torpedo gunboat	....	Fairfield Company	....	2,880	Thornycroft	12,800	265.2	1228	14.0 "	1.8	....	....	....	5,837	21.643 "	....
Jason*	Ditto	....	Ditto	....	2,880	Do	12,800	266.2	1208	15.0 M.M.	1.74	....	....	....	5,869	21.931	....
Circe*	Ditto	....	Ditto	....	2,880	Do	12,800	266.6	1211	14.318 "	1.76	....	....	....	6,021	21.694	....

* Re-engined.

M.M. = Measured Mile.

† Speed not taken on measured mile.

Jason[a]	Gunboat	....	Ditto	....	2,950	Do	12,800	268.2	1258	15.0 M.M.	1.74	....	....	....	5,829	21.982	....
Circe[a]	Ditto	....	Ditto	....	2,950	Do	12,800	266.6	1211	14.918 "	1.76	....	....	....	5,621	21.694	....

[a] Re-engined. M.M. = Measured Mile. † Speed not taken on measured mile.

TABLE II.—RESULTS OF OFFICIAL STEAM TRIALS OF TORPEDO-BOAT DESTROYERS AND TORPEDO-BOATS MADE DURING 1903.

NAME OF VESSEL.	MAKERS OF HULL AND ENGINES.	Length.	Displacement.	Type of Boiler.	Heating Surface.	Grate Area.	FOUR HOURS' SPEED TRIALS.		FOUR HOURS' COAL CONSUMPTION.		
							Indicated Horse-Power.	Speed.	Indicated Horse-Power.	Speed.	Coal per I. H.-P. per Hour.
		ft.	tons		sq. ft.	sq. ft.		knots		knots	lb.
Erne	Palmers Company	225	540	Reed	15,514	319	6957	25.606	7108	25.395	2.25
Usk	Yarrow and Co.	225	550	Yarrow	16,000	270	7633	25.873	7789	25.372	1.79
Teviot	Ditto	225	550	Ditto	16,000	270	7827	25.468	7823	25.405	1.90
Itchen	Laird Brothers	220	549	Laird	14,880	253	6967	25.642	6842	25.25	2.46
Ettrick	Palmers Company	225	540	Reed	15,514	319	7119	25.568	7067	25.313	2.33
Exe	Ditto	225	540	Ditto	15,514	319	7114	25.64	6856	25.292	2.11
Arun	Laird Brothers	220	549	Laird	14,880	253	7028	25.722	6885	25.39	2.08
Blackwater	Ditto	220	549	Ditto	14,880	253	6939	25.656	7237	25.414	2.62
Foyle	Ditto	220	549	Ditto	14,880	233	7128	25.65	6956	25.450	2.79
Velox	Armstrong (hull) Parsons Company (engins)	210	440	Yarrow	13,300	252	Turbines	27.077	Turbines	27.124	
First-Class Torpedo-Boat "No. 109"	Thornycroft	165	200	Thornycroft	6,200	105	2871	25.296	2778	25.219	2.809
Ditto "No. 110"	Ditto	165	200	Ditto	6,200	105	3000	25.333	2885	25.12	2.68
Ditto "No. 111"	Ditto	165	200	Ditto	6,200	105	2926	25.436	3001	25.321	2.73
Ditto "No. 112"	Ditto	165	200	Ditto	6,200	105	3000	25.311	2901	25.28	2.49
Ditto "No. 113"	Ditto	165	200	Ditto	6,200	105	2934	25.122	2830	24.753	2.80

that it conforms fairly closely to the design adopted in the case of cruisers, there being four cylinders working on the triple-compound system. The high pressure cylinder is 33½ inches; the intermediate, 54½ inches; and the two low-pressure cylinders 63 inches in diameter, the stroke being 48 inches. The full power was to be realized with a piston speed of 960 feet, which is considerably higher than in preceding battleships, where 918 feet was the designed speed. But in our later battleships 960 feet has been adopted as the standard. It may not be without interest to note the results of the trials of all these ships, especially as we have already made important reservations in connection with comparisons:

TABLE III.—STEAM TRIALS OF SIX VESSELS OF THE DUNCAN CLASS.

Name.	30 Hours' Trial at One-Fifth Power.		60 Hours' Trial at 70 p.c. Power.		8 Hours' Trial at Full Power.	
	I.H.P.	Coal Consumption. lb.	I.H.P.	Coal Consumption. lb.	I.H.P.	Coal Consumption. lb.
Duncan	3755	2.05	13,717	1.90	18,222	1.95
Russel	3767	2.4	13,685	2.14	18,199	2.10
Montagu	3676	2.21	13,652	1.78	18,113	2.22
Exmouth	3667	2.18	13,774	1.95	18,285	2.117
Cornwallis	3724	1.96	13,687	2.09	18,201	1.89
Albemarle	3606	2.26	13,576	2.11	18,301	1.96

The speed of the ships varied considerably, but there can be no question about their being able to steam 19 knots. The Exmouth, on the measured mile, made 19.015 knots; and although the speed of the two ships tried on the measured mile during the past year fell slightly short of the 19 knots, there is no reason to question their ability to attain this speed under normal conditions.

But, as regards speed, the most interesting results are unquestionably those associated with the seven cruisers of the County class included in Table I. These vessels, of which a large number have been ordered for the Navy (two having passed through their trials in 1902), have been the subject of much comment, alike as regards their gun-power, their armor protection, their lines forward and their speed. It is not proposed here to enter into the question of the gun-power, excepting to note that the later vessels of the class have had modifications to increase their ordnance and also the thickness of their side armor. As regards hollow lines, these have been continued, not only in the Devonshire class, but also in the Duke of Edinburgh, although in the latter the hull more closely approximates to a straight line; aft, there is a slight hollow at the water-line, which may assist the wake. But, after all, we are concerned here more with those machinery elements which make for speed, and reference may be made to the very interesting trials conducted with different forms of propellers. In the earlier of the County class, the propellers were 16 feet in mean diameter, of 19 feet 6 inches mean pitch, and had an exposed area of 54 square feet. These vessels, however, did not quite come up to their full speed, even when the designed power was indicated. Thus, the speed of the Bedford was 22.7 knots; the Kent, 21.7 knots; the Monmouth, 22.38 knots; and the Essex, 22.79 knots. As the result of experiments, it was decided to adopt propellers of increased surface, and the later ships have been fitted with screws, still with four blades, but having a diameter of 15 feet 9 inches, a pitch of 20 feet, with a surface increased to 80 square feet. The result has been most marked.

The five ships which have since been tried have ranged in their speed from 23.568 knots to over 24 knots, so that the addition to the surface of the propeller has, for practically the same power, yielded an extra mile per hour to the speed. These five ships have each given very good results so far as the machinery is concerned. The boilers are of the Belleville

type, with the exceptions of the Berwick and Suffolk, in which the Niclausse design has been adopted. In should be, perhaps, interpolated here that the practice of adopting cylindrical boilers for one-fifth power was resorted to after the ordering of the ships comprised in Table I. It may be noted that in those cruisers the allowance of heating surface per indicated horse-power embraced in the design was about 2.29 square feet, while 13.65 indicated horse-power was to be realized per square foot of surface. The weight allowed for machinery averaged about 1750 tons, so that 12½ horse-power had to be attained per unit of weight. This marks the highest results called for in recent design, and it is not too much to say that, without this limitation in weight, the high speed could scarcely have been realized. In the later cruisers of the Duke of Edinburgh class the weight has been considerably increased, the total for about the same power being 2250 and 2300 tons, which works out to about 10½ indicated horse-power per ton of machinery.

The trials of the County ships were carried through promptly and without trouble. It will be noted that the coal consumption on the low-power trial varied between 1.83 lb. and 2.1 lb., while on the trial at about 16,500 indicated horse-power the rate ranged from 1.45 lb. to 2.22 lb., at full power the consumption was at the rate of from 1.91 lb. to 2.22 lb. per unit of power per hour. Perhaps the most interesting fact about the later ships is that at 16,000 indicated horse-power they can maintain a speed of 22 knots. This is regarded as the speed which may be maintained so long as coal can be got from the bunkers; and, as the duration of the official trial at this power was 30 hours, it may be assumed that this performance ought to be maintained for an unlimited period so far as the machinery and boilers are concerned. The Niclausse boiler ships, it will be noted, have low coal-consumption results on all three trials; but the Monmouth, with Belleville boilers, is quite as economical, which only shows again that one must not reason from the particular to the general.

The Euryalus, which comes next on our list, is one of the Cressy class, and her trials have been delayed owing to an unfortunate accident in the dock, which can only be placed under that comprehensive phrase, "an act of God." Perhaps the interesting point of this ship is the apparent difference which increased displacement makes in the speed of a vessel. Here the power anticipated in the design was 21,000 indicated horse-power; but as the vessel displaced 12,000 tons, as compared with 9800 tons in the case of the seven cruisers of the County class in the list, the speed, for almost the same power, was practically 2 miles per hour less. This vessel, however, is fitted with propellers having a smaller surface per unit of diameter; and as it has been found with the Drake class, as well as with the later County cruisers, that these large-surface and coarse-pitched propellers give better speeds, it may be assumed that part of the difference is attributable to the propeller. The next cruiser on the list—the Challenger—is, perhaps, interesting because it is the largest yet engined by the Wallsend Company. In this case the Babcock and Wilcox boiler was installed, and it will be seen that the coal consumption on all of the three trials averaged only 1.75 pounds per unit of power. Doubtless the Admiralty's satisfaction with the results had something to do with the awarding to the same company of a contract for machinery of 23,500 indicated horse-power, for the Warrior, recently laid down at the Pembroke Dockyard.

The Clio, which was fitted with Niclausse boilers, completes our list so far as new ships are concerned; but there is added to the table the results of the trials of the three gunboats which have had new engines constructed by the Fairfield Company. These three gunboats were included in the Naval Defence Act fleet, and were launched about twelve years ago. They were originally fitted with boilers of the locomotive type, the power then developed being 3500 indicated horse-power, with a speed of 19½ knots. Thornycroft steam-generators have been substituted, and new engines of the four cylinder triple-expansion type, of greater power, were installed,

with the result that the full power was increased to 5800 indicated horse-power, and the speed to 21¾ knots, the Jason coming out at 21.93 knots. This is an increase of 2½ knots to the speed for an addition of about 66 per cent to the power.

Turning now to Table II, which gives the results of the trials of the torpedo-boat destroyers, it will be noted that nine vessels of this description are included. These ships were designed to attain a speed of 25½ knots, the scantlings of the hull being considerably strengthened as compared with the original 30-knot destroyers, while at the same time a high forecastle was added, so as to make the vessels more seaworthy. The result has been to increase the displacement of the boats from 300 or 330 tons to 540 or 550 tons, the length remaining at 225 feet, as compared with 210 feet to 215 feet. There has been a proportionate increase in beam. It has been necessary to develop from 7000 to 7800 horse-power in order to attain the speed, whereas 30 knots was got in some of the earlier destroyers for from 5500 to 6500 indicated horse-power. It will be noted that Messrs. Palmers have completed during the year the trials of three of these vessels; Messrs. Laird (of Birkenhead), of four; and Messrs. Yarrow, of two. The results are all set out in the table, and the reader will no doubt find there interesting matter for comparison. In three instances the coal consumption has exceeded 2½ lb., and in this case, of course, the vessels had to carry a weight equivalent to this increased consumption during a four-hour trial. It is, perhaps, worthy of note that on the full-power trial the boilers—in the case of the Itchen, for instance—burned 72 lb. of coal per square foot of grate.

The trials of the Velox were of special interest, as she is fitted with Parsons turbines instead of ordinary reciprocating engines. This vessel, however, is considerably lighter than the destroyers to which we have just been referring, her displacement being only 440 tons, so that it is not possible to make any comparison as regards the results. None of our previous destroyers approximated to this displacement, but we are glad to note that the Admiralty have in contemplation a very exhaustive trial of this vessel, with a view of determining the steam consumption, and therefore the relative efficiency, of the turbine, as compared with the ordinary piston engine, for such craft. Five of Thornycroft's torpedo-boats are also included in the table. All of these vessels are of the same design, and it will be noted that the variations in speed are between 25.12 and 25.43 knots. Curiously enough, this minimum and maximum speed was attained with practically the same power. The weather, or some other of the many variant conditions, might militate against speed, so that, however interesting such comparisons may be, they are more or less illusory.—*Engineering.*

MISCELLANEOUS.

SCREW PROPELLERS.—The question as to whether the turning inwards or outwards of twin-screw propellers gives the higher efficiency, has been the subject of many experiments. The practice in the navy is to adopt in-turning screws, while in the merchant service the engineers still prefer the ordinary system of out-turning screws. Mr. R. E. Froude made recently in the Government ship model tank a large number of experiments, which tended to show that, although there was an admittedly slight disadvantage so far as manœuvring power is concerned, there was a gain in efficiency of about 1.5 per cent. This was the average deduced from tests with models of three battleships, 12 cruisers, five destroyers, and a shallow draught vessel. The primary argument in favor of in-turning screws, however, is that they greatly facilitate the arranging of the starting platform in the engine-rom in the centre, so that the engineer standing at the door of the longitudinal bulkhead has under his observations all the levers, etc., of both engines. In the merchant service, however, this same result

is obtained while retaining the out-turning screws by the adoption of heavy front framing for the engines.

A new light has now been thrown on the subject by extensive research work which has been carried out in the Italian Government experiment tank on a scale as considerable as the work of Mr. Froude. The important point of this Italian experimental work is that the efficiency of the screw varies with its position in relation to the hull of the ship. When the propellers are arranged as far aft as possible and well removed from the shell plating or hull of the ship, the efficiency is practically the same for out-turning and in-turning propellers. If, however, the propeller is built close to the hull there is a loss of efficiency when the propellers turn inward, although it is not very great. When the propellers are placed well forward and close to the hull there is a still greater loss in efficiency with in-turning propellers, so that it will be recognized that the closer the propellers are to the body of the ship the greater the relative efficiency for out-turning screws. The position of the propellers thus affects the variation of efficiency due to the changed direction of their rotation. Out-turning screws increase their comparative efficiency by being removed from the longitudinal plane of the ship. This may be explained by the difference of speed of the particles of water composing the weight current in the region in which the propellers work. The Italian authorities do not seek to set up the results as infallible, nor do they wish that general conclusion should be based on these results, extensive as the experiments have been; but it is obvious that they have opened up a field for experimental research which may have an important bearing on screw propeller efficiency, regarding which so little that is exact has yet been determined.—*United Service Gazette.*

BREAKDOWNS IN THE NAVY.—Last week we commented on the desire to save weight in the machinery of the ships of the Royal Navy. We by no means exhausted the subject. The blue-book containing the report of the admirals who carried out the naval manœuvres last autumn contains much that is not pleasant reading. It will be remembered that moderately high sustained speed was wanted. It was not obtained. With few exceptions, none of the ships complied with the demands made on them by the admirals. This fact is not satisfactory, but at least it represents nothing disastrous. One fleet was as bad as the other. It is not probable that the fleet of a foreign foe would be found in real warfare to do better. But we cannot comfort ourselves with such arguments when we have to do with breakdowns, which disabled battleships, or cruisers, at most critical moments. When combatants are pretty equally matched, the loss of a ship may be followed by a rout. The number of units in a naval force is in modern days comparatively small; and the loss of even one ship represents a considerable percentage of the whole.

The details of the breakdowns which have been published are meagre. Possibly it has not been deemed good policy to say much about them. It is certain that had Parliament been sitting, awkward questions would have been put to the Government; and we venture to hope that the engineers of the Royal Navy will take what we have to say in good part. Serious breakdowns there were none. The defects which did so much harm were for the most part trifling in themselves, strictly avoidable, and should not have occurred. For example, one vessel was disabled for some hours because the packing of a main stop-valve leaked. We take it for granted that this was one of the normal screw-down throttle valves, with a spindle passing through a packed stuffing box. We have three alternatives to consider. Either the spindle had not been properly packed; or the valve was of such defective design that it could not be properly packed; or the pressure was so high that the packing could not be got to stand. These alternatives simply mean a shifting of responsibility. If the pressure was not

too high, and the valve was not badly designed, then the engine-room staff of the ship were directly responsible for a failure the magnitude of which is not to be measured by the dimensions of the stop valve. If the valve was so badly designed that it could not be packed, then the engineering authorities at Whitehall are to be blamed for accepting it as satisfactory. If the pressure was so high that the packing, however good, could not be maintained steam tight in an excellent valve, then the sooner we discard a working condition which renders continuous working impossible the better. No fewer than twelve battleships and cruisers broke down during the few days that the operations of war lasted. To the superintendent engineers of the mercantile marine we fear that most of the failures will appear inexcusable. What, for example, would be thought of the engine-room staff of, say, the Campania or the Deutschland if, crossing the Atlantic, they had such a record as that of the Powerful: "Compelled to stop port engine to clear crank pits of water when going 18 knots; go-ahead guide surface of starboard low-pressure engine heated; three glands of main stop valve leaking badly; fusible plugs blowing out; ship had to return to Gibraltar for repairs." And all this at about half-power. Take, again, the Drake—another magnificent modern cruiser:—"Starboard after low-pressure crank pin over-heated and scored at 100 revolutions, and did not run afterwards at over 75. After repairs the ship was able to steam at 12½ knots until the end of the manœuvres"—that is to say, about quarter-power. Or the Diadem:—"Engine defects reduced speed to 15 knots until remedied, and continual loss of water. Ship returned to central rendezvous for a time." Then we have the unfortunate Sutlej:—"Water disappeared from No. 5 boiler, priming. At 99 revolutions port intermediate pressure crank head brasses, and main bearings on each side of them, became heated three times, and could not run afterwards at over 89 revolutions." In the King Alfred "the port intermediate brasses were melted, and the starboard high-pressure cylinder cover joint failed." The Exmouth was stopped for twenty-two hours by the failure of the metallic packing of a low-pressure piston-rod; and even after repairs she could not manage to attain a higher speed that 12 knots. We might, we are sorry to say, extend this list; we have taken the cases cited at haphazard.

The first conclusion at which we arrive is that all these failures were due to incompetence in the engine-room. Hot bearings ought not to occur. Glands ought not to blow. Cylinder cover joints, if properly made, will remain tight, and so on. But, on the other hand, if the engine-room staffs are really blameless, as is possible, what are we to think of boilers and machinery that play the admirals false the moment they are asked to do anything like the work for which they are intended? We do not know which of the two alternatives is the worse, and there is no getting away from or minimizing the facts. The engineers may urge in their defence that they were short-handed. The argument is a very good one; but, none the less, it suggests a most serious defect in the arrangements of the Admiralty. They may urge that the short connecting-rods and high speed render it impossible to run for any period without incurring serious risk of hot bearings. This is, as we have said, merely shifting blame; and in order that the argument may be convincing, it will be necessary to satisfy experts that the brasses were properly treated—a matter concerning which we may refer our readers to an article which appeared in our pages on the 16th of October, and a letter signed "Superintending Engineer," on the same subject, which we published on the 23rd of October.

It is, of course, waste of time to mourn over the past; but an irreparable mistake will be made if the lessons taught by the breakdowns which took place during the manœuvres are allowed to pass into oblivion. Each one of them should be made the subject of a searching inquiry; not with the intention of censuring anyone, but of devising such arrangements that they cannot occur in future. Nothing can be more suicidal than the argument that because the failures were in small things, or in small ways, they

really had no significance. Every failure that disables a ship is of the last importance and the smaller the failure the less excuse is therefore its occurrence.—*Engineer.*

SPEED IN SHIPBUILDING.—The fact that the 16,500-ton battleships ordered by Japan from the Elswick and Barrow firms are to be built in 18 months from the signing of the contract has caused no little astonishment. Last year a question was asked in the House of Commons as to the time consumed during recent years between the date of the sanction of a battleship by the House of Commons and her completion. Arnold-Foster replied three years and ten months. So, when a short time ago a writer in the press asserted that in at least two yards a battleship could be completed, trials, included in 20 months, the statement was met with incredulity. The writer proceeded to say that by due attention to standardization and care to mitigate the limiting factor—which to-day is gun mountings—the largest battleships could be built in 18 months. The Japanese contracts will fairly test the accuracy of his statements.—*Iron Age.*

Note.—It is now stated that the contract time for three ships is 27 months and not 18 months.—*Editor.*

BOOK NOTICES.

"Practical Field Exercises in Tactics and Stategy," by Major John P. Wisser, U. S. Army, an up-to-date publication, fills a long-felt want for both students and instructors in military science. It gives a series of progressive exercises for infantry, cavalry and artillery, acting independently with a force involved varying from a patrol to a regiment of infantry or cavalry; from one to twelve batteries of field artillery; and for the three arms combined, from a battalion to an army corps. The exercises are varied, and include the service of security and information, the tactics of the three arms separately and combined, and special services as convoy, sanitary arrangements, supplies, field fortifications, camping, etc.

Accompanying the text is a series of maps (under separate cover) of the terrain on which the exercises are to be carried out.

This book will be found of great value as a supplement to the purely theoretical text-book and as a preparation for field exercises, and camps of instruction, and is well worth the careful study of all officers, both military and naval, as the latter's duties (in these times) often call them to act on shore for varying periods.

The book is published by the Hudson-Kimberly Publishing Company, Kansas City, Missouri.

"The New American Navy," from the pen of the Honorable John D. Long, presents in two volumes a subject of widespread interest.

It is doubtful if there is any subject now before the American people about which more national interest is shown than that of their navy; and these volumes from the authoritative source of an ex-Secretary of the Navy, and from a man noted for his conservatism, and his freedom from sensationalism, sectionalism and prejudice, can not fail to be enlightening as well as highly interesting. They were first published in the form of a serial in the weekly issues of the *Outlook;* here the character of the publication combined with that of the author to give the series a high educational value. The *Outlook* Company now gives them to the public in book form, in two well-bound volumes of convenient size.

The history of the upbuilding of the new navy is given, not in tedious style, but in a way to interest both the general reader and the technical. The chapters dealing with the preparation for the war with Spain should be of interest to the public, and of particular interest to many navy officers whose time was so taken up with individual duties and preparation that they hardly realized all that was necessary and was done in the way of *ground* preparation—such as the Department embracing the whole navy had to deal with.

The history of the war itself compares in interest with the press history contemporaneous with the war, with the advantage that it is shorn of the sensational and unreliable features and comments that, at such times, press writers are apt to indulge in.

Both volumes are profusely illustrated, giving reproductions of photographs of practically all the officers who played important parts in preparing for and carrying on the war.

There are also interesting groups, and pictures of old-type navy vessels, and new ones down to the latest battleships and destroyers.

As constituting a branch of the navy, the marine corps, and the importance of it are commented upon, in a way that the highly creditable record of the corps would demand.

The volumes should be read by naval officers, and should be placed in crews' libraries for the benefit of the enlisted personnel. To such of the public as take an interest in the navy, they will prove both interesting and educational.

"America in the China Relief Expedition," by Brig.-Gen. A. T. Daggett, U. S. Army, Retired, recently issued by the Hudson-Kimberly Publishing Company of Kansas City, is a detailed account of the brilliant part played by United States soldiers and marines, in the campaign, undertaken in the summer of 1900, for the relief of the beleaguered legations at Pekin, China. General Daggett, then Colonel, commanding the 14th U. S. Infantry, does not write from hearsay, but from personal experience and observation, and as he occupied a position giving exceptional opportunity for knowing the facts of the movements and accomplishments of the United States troops, his interesting narrative will form a lasting source of information, nowhere else obtainable, for those who desire to learn the true history of America's share in the China Relief Expedition.

The INSTITUTE is in receipt of the "Report on the West Point and Fort Riley Manœuvres" by Colonel Arthur L. Wagner, Asst. Adjutant-General, U. S. Army. Col. Wagner, who was the chief umpire of the manœuvres, is well known as an authority in strategy and tactics, and his report will be of great value to all students of these subjects. Published by the Hudson-Kimberly Publishing Co., Kansas City, Mo. Price 75 cents.

"The Electric Club," an organization of Westinghouse engineers, has just undertaken the publication of a monthly magazine, *The Electric Club Journal*, for the purpose of printing the best of their own current work supplemented by other appropriate engineering material. The first number of *The Electric Club Journal*, which is in our hands, contains a number of articles which will be of interest and value to electrical engineers, and the new publication gives promise of being well suited to the needs of young men who are looking forward to doing effective engineering work either in the electrical or in other fields. Subscription price $1.00 per year. Address P. O. Box 911, Pittsburg, Pa.

ANNUAL REPORT OF THE SECRETARY AND TREASURER OF THE U. S. NAVAL INSTITUTE.

To the Officers and Members of the Institute:

Gentlemen:—I have the honor to submit the following report for the year ending December 31, 1903.

Itemized Cash Account.

Receipts during the Year 1903.

Items.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Totals.
Dues	$ 353 12	$ 873 85	$ 751 41	$ 386 60	$ 2364 98
Subscriptions	233 62	302 95	176 91	193 02	906 50
Sale of proceedings	49 73	81 33	123 12	30 40	284 58
Sale of extra publications	3981 78	2621 76	2183 42	5195 53	13982 49
Advertisements	249 00	334 40	355 00	331 25	1269 65
Binding	1 00	16 60	18 10	1 00	36 70
Life fees	30 00	30 00	60 00	30 00	150 00
Credits	94	1 50	87	....	3 31
Interest	207 26	71 62	36 50	95 22	410 60
Cash for check	....	109 65	....	....	109 65
Premium on money orders	....	04	05	09	18
Postage	....	....	59	....	59
Rhode Island Trust Company	....	....	....	1000 00	1000 00
Society for savings	....	....	....	1000 00	1000 00
Southern railway bond	....	....	....	1135 00	1135 00
Totals.	$5106 45	$4443 70	$3705 97	$9398 11	$32654 23

EXPENDITURES DURING THE YEAR 1903.

Items.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Totals.
Printing and binding proceedings	$ 815 97	$ 939 47	$ 574 60	$ 711 61	$ 3041 65
Printing extra publications	1967 94	1478 43	1611 61	4386 16	9044 14
Paid authors for text-books	400 00	120 00	100 00	300 00	920 00
Salaries	442 25	450 00	450 00	460 00	1802 25
Postage	79 87	77 41	49 00	83 47	289 75
Cost of articles published in proceedings	195 00	....	62 00	60 00	317 00
Expressage	15 62	10 78	8 30	28 52	63 22
Freight and hauling	8 53	6 10	5 17	11 18	30 98
Discount on checks	85	1 55	1 70	1 00	5 10
Stationery	14 70	24 65	5 05	55 54	99 94
Office expense	5 60	....	....	3 25	8 85
Furniture	4 15	....	....	....	4 15
Telegrams	60	1 92	1 51	2 72	6 75
Purchase of publications	6 80	6 00	....	85	13 65
Commission to advertising agent	80 00	100 00	....	25 00	205 00
Prize essay	100 00	....	....	....	100 00
Prize essay medal	25 80	....	....	....	25 80
Paid for essays, honorable mention	110 00	....	....	....	110 00
Typewriter	50 00	....	....	....	50 00
Check for cash	....	109 65	....	....	109 65
Rent for safe deposit box	....	5 00	....	....	5 00
Deposited to credit of reserve fund	....	509 14	....	....	509 14
Purchase of back nos. proceedings	....	....	3 50	....	3 50
Insurance	....	....	19 50	36 00	55 50
Sec'y and treas. business trip to Washington	....	....	....	4 00	4 00
Clerk's trip to Baltimore, business	....	....	....	2 00	2 00
Subscription A. and N. directory	....	....	....	5 00	5 00
Purchase of map	....	....	....	83	83
Check returned for endorsement	....	....	....	3 00	3 00
Check to R. I. Trust Company	....	....	....	1000 00	1000 00
Check to society for savings	....	....	....	1000 00	1000 00
Purchase of Southern R. R. bond	....	....	....	1135 00	1135 00
Totals.	$4323 68	$3840 10	$2891 94	$9315 13	$20370 85

SUMMARY.

Balance of cash unexpended Jan. 1, 1903, including $509.14, held to credit of reserve fund	$5730 15
Total receipts for 1903	22654 23
Total available cash, 1903	$28384 38
Total expenditures, 1903	20370 85
Cash unexpended January 1, 1904	$8013 53
Held to credit of reserve fund	150 00
True balance January 1, 1904	$7863 53
Bills receivable for dues 1903	916 69
" " " back dues	539 12
" " " binding	17 00
" " " subscriptions	23 00
" " " sales	1667 11
" " " advertisements	304 00
Value of back numbers of Proceedings (estimated)	640 00
" " Institute property	300 00
" " extra publications	3428 80
Total assets, exclusive of reserve fund	$15699 25

RESERVE FUND.

District of Columbia 3.65 registered bonds	$2000 00
" " " coupon bonds	650 00
Deposited in Seamen's Bank, New York City, N. Y.	1433 14
" " Farmer's National Bank, not invested	150 00
Total	$4233 14

Very respectfully,

PHILIP R. ALGER, *Professor, U. S. Navy,*
Secretary and Treasurer.

LIST OF PRIZE ESSAYS.

1879.

Naval Education. Prize Essay, 1879. By Lieut-Com. A. D. Brown, U.S.N.

NAVAL EDUCATION. First Honorable Mention. By Lieut.-Com. C. F. Goodrich, U.S.N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U.S.N.

1880.

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U.S.N.

1881.

The Type of (I) Armored Vessel, (II) Cruiser best suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U.S.N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U.S.N.

1882.

Our Merchant Marine: The Causes of its Decline and the Means to be taken for its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. J. Kelley, U.S.N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U.S.N.

"SPERO MELIORA." Honorable Mention. By Lieut.-Com. F. F. Chadwick, U.S.N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U.S.N.

1883.

How may the Sphere of Usefulness of Naval Officers be extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U.S.N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U.S.N.

"CUILIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U.S.N.

1884.

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U.S.N.

1885.

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U.S.N.

1886.

What Changes in Organization and Drill are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U.S.N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORT FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U.S.N.

1887.

The Naval Brigade: its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins, U.S.N.

1888.

Torpedoes. Prize Essay, 1888. By Lieut.-Com. W. W. Reisinger, U.S.N.

1891.

The Enlistment, Training and Organization of Crews for our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U.S.N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U.S.N.

1892.

Torpedo-boats: their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894.

The U.S.S. Vesuvius, with Special Reference to her Pneumatic Battery. Prize Essay, 1894. By Lieut.-Com. Seaton Schroeder, U.S.N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U.S.N.

1895.

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut.-Com. Richard Wainwright, U.S.N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U.S.N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U.S.N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U.S.N.

1896.

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U.S.N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U.S.N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U.S.N.

THE COMPOSITION OF THE FLEET. Honorable Mention, 1896. By Lieutenant John M. Ellicott, U.S.N.

1897.

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U.S.N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U.S.N.I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U.S.N.

1898.

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U.S.N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut.-Com. Richard Wainwright, U.S.N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U.S.N.

1900.

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U.S.N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U.S.N.

1901.

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U.S.N.

1903.

Gunnery in Our Navy. The Causes of its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U.S.N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U.S.N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U.S.N

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U.S.N.

1904.

The Fleet and its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL, AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

NOTICE.

The U. S. Naval Institute was established in 1873. having for its object the advancement of professional and scientific knowledge in the Navy. It now enters upon its twenty-eighth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII.

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fee to the Secretary and Treasurer, or to the Corresponding Secretary of a Branch. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control, and a vote equal to one-half the number of regular and life members, given by proxy or presence, shall be cast, a majority electing.

Sec. 5. Associate members shall be elected from officers of the Army Revenue Marine, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control, and, if their report be favorable, the Secretary and Treasurer shall make known the result at the next meeting of the Institute, and a vote shall then be taken, a majority of votes cast by members present electing.

The Proceedings are published quarterly, and may be obtained by non-members upon application to the Secretary and Treasurer at Annapolis, Md. Inventors of articles connected with the naval profession will be afforded an opportunity of exhibiting and explaining their inventions. A description of such inventions as may be deemed by the Board of Control of use to the service will be published in the Proceedings.

Single copies of the Proceedings, $1.00. Back numbers and complete sets can be obtained by applying to the Secretary and Treasurer, Annapolis, Md.

Annual subscriptions for non-members, $3.50. Annual dues for members and associate members, $3.00. Life members fee, $30.00.

All letters should be addressed to Secretary and Treasurer, U. S. Naval Institute, Annapolis, Md., and all checks, drafts and money orders should be made payable to his order, without using the name of that officer.

OFFICERS OF THE INSTITUTE.

President.

REAR-ADMIRAL H. C. TAYLOR, U. S. NAVY.

Vice-President.

CAPTAIN W. H. BROWNSON, U. S. NAVY.

Secretary and Treasurer.

PROFESSOR P. R. ALGER, U. S. NAVY.

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Commander W. F. HALSEY, U. S. Navy.
Lieutenant J. M. POYER, U. S. Navy.
Lieutenant W. H. G. BULLARD, U. S. Navy.
Professor N. M. TERRY, A. M., Ph. D.
Lieutenant R. H. JACKSON, U. S. Navy.
Professor PHILIP R. ALGER, U. S. Navy. (ex-officio.)

SPECIAL NOTICE.

NAVAL INSTITUTE PRIZE ESSAY, 1904.

A prize of two hundred dollars, with a gold medal, and a life-membership in the Institute, is offered by the Naval Institute for the best essay presented on any subject pertaining to the naval profession, subject to the following rules:

1. The award for the prize shall be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay in a sealed envelope to the Secretary and Treasurer on or before January 1, 1904. The name of the writer shall not be given in this envelope, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary and Treasurer, with the motto on the outside and writer's name and motto inside. This envelope is not to be opened until after the decision of the Board.

3. The successful essay to be published in the Proceedings of the Institute; and the essays of other competitors, receiving honorable mention, to be published also, at the discretion of the Board of Control; and no change shall be made in the text of any competitive essay, published in the Proceedings of the Institute, after it leaves the hands of the Board.

4. If, in the opinion of the Board of Control, the best essay presented is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention" or such other distinction as the Board may decide.

5. In case one or more essays receive "Honorable Mention," the writer of the first of them in order of merit will receive seventy-five dollars and a life-membership in the Institute.

6. Any essay not having received honorable mention, may be published also, at the discretion of the Board of Control, but only with the consent of the author.

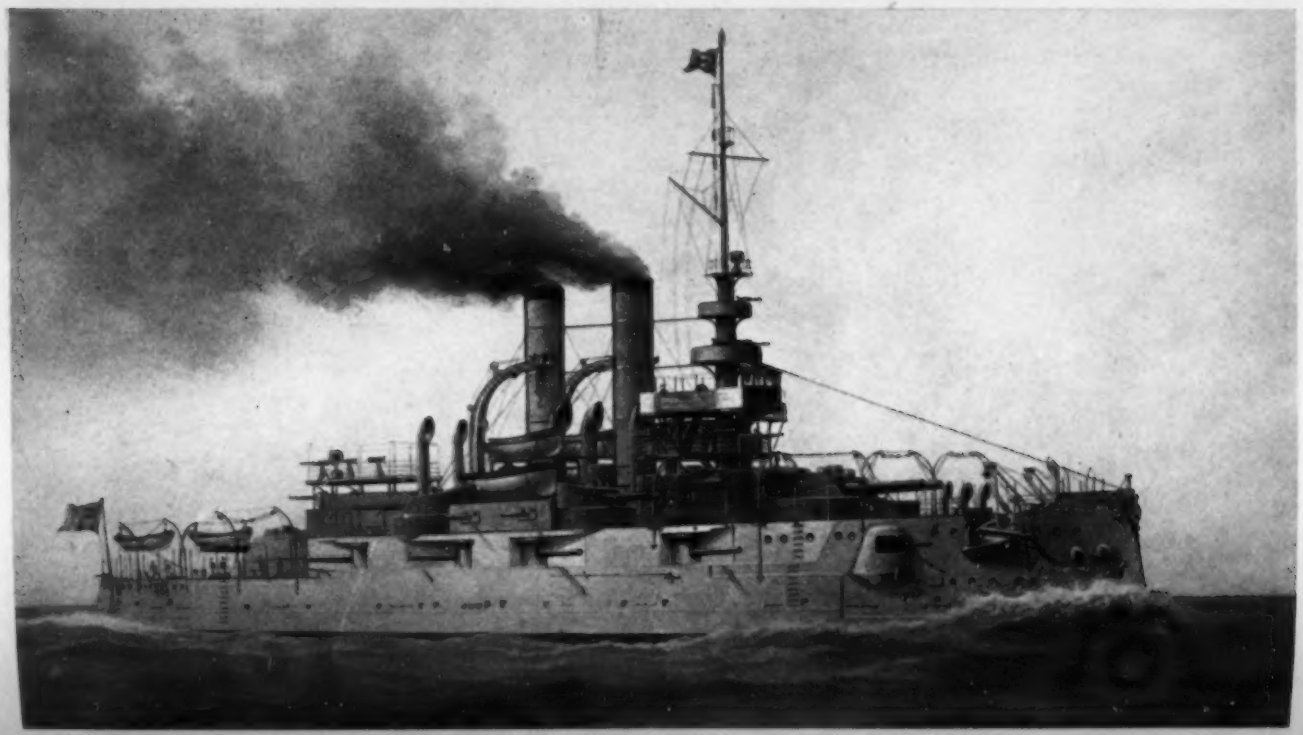
7. The essay is limited to fifty (50) printed pages of the Proceedings of the Institute.

8. All essays submitted must be either typewritten or copied in a clear and legible hand.

9. In the event of the Prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

PHILIP R. ALGER,
Professor, U. S. N., Secretary and Treasurer.



U. S. S. IDAHO.